FLIGHT & The AIRCRAFT ENGINEER.

First Aero Weekly in the World

Founder and Editor: STANLEY SPOONER

A Journal devoted to the Interests, Practice, and Progress of Aerial Locomotion and Transport

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EDITORIAL COMMENT.

WE are completely at a loss to imagine how a supposedly responsible journal like the *Daily Express* allowed its leg to be pulled to the extent of committing itself to the senseless and mischievous statement which appeared in its columns on the 18th inst., to the effect that Lord Weir had resigned the Secretaryship of the Air and that the R.A.F. was to pass under the control of the War Office. As to the first part of this announcement, it is true enough that Lord Weir is leaving the Air Ministry, as it was his intention to do as soon as the war ended. His was entirely a war appointment and was never meant to be anything else, inasmuch as he has very great private interests to look after—interests which he was perfectly willing to neglect in the service of the country so long as was necessary, but which now require his urgent attention. "Resignation" is not quite the right word to be applied in this case. The position is that, Parliament having been dissolved, every Minister has automatically placed himself at the disposal of the Premier and is simply carrying on until a successor has been appointed. That is what Lord Weir is actually doing now, and when the new Ministerial appointments are announced a new Secretary for the Air will be among them. In the circumstances there is no need for "resignation."

A Senseless Canard

As to the statement that the R.A.F. will revert to the War Office, there is not an atom of truth in it. There cannot in fact be a vestige of authority for it, as the *Daily Express* would have recognised if it had stopped to think. The R.A.F. was constituted a year ago by Act of Parliament and is a constitutional force, as much as the Royal Navy or the Army, and cannot be altered in its constitution except by virtue of another Act of Parliament or by the repeal of the Air Force Act. A great many peculiar things have been done during the war—even to the overriding of Acts of Parliament, including such a time-honoured statute as the Habeas Corpus Act—but this is one that cannot be done. What may be in the minds of certain interested parties—including the author of the *Express* canard, at whose identity we could make a shrewd guess—we have no means of knowing, nor does it greatly matter, but we do know this: that there is no intention whatever of altering the constitution of the R.A.F., and that Parliament alone could change it if there were. There is no need at all, in the circumstances, to adduce a single argument in favour of leaving well alone. The record of the R.A.F. since it acquired its own separate existence supplies all that is necessary in that direction, so we will leave it at that, with the expression of our sincere regret that any newspaper of repute has been so led astray as to make a statement so entirely contrary to fact and so utterly foolish on the face of it.

THE YEAR IN REVIEW

WHEN, a year ago, we penned our review of the events of 1917, we were still in the midst of the Great War, and peace within the twelvemonth seemed the remotest of remote possibilities. America, although in the war, had not begun to make her weight felt. Italy had not recovered from the disaster of Caporetto and was fighting hard to keep the Hun from overrunning the whole of the Venetian Plain. The collapse of Russia was complete, and she had long ceased to count as a factor. In the West the condition had passed to one of virtual stalemate, in which we were anticipating a final great offensive by the enemy—an offensive which we believed we could hold, but one the issues of which were nevertheless in doubt.

The Passing of 1918

Then, in March, the offensive broke, and for weeks we were steadily pressed back, incurring tremendous losses, and for months the fate of the war hung in the balance. Our Fifth Army completely disappeared in the first few days of the German onslaught, and only by the devoted gallantry of our own men and their French comrades was the advance of the enemy towards Paris and the Channel ports finally stemmed. It is giving away no secret now to disclose that so near did we come to defeat that every preparation had been made to evacuate the Channel ports and remove the remnants of the British armies from north of the Somme to a more favourable theatre of war. The culmination of the German effort came in July, when the Crown Prince's armies attacked from Soissons to east of Rheims, and actually reached the Marne. Then, in the middle of that month, the Allied armies now under the supreme command of that consummate soldier, Marshal Foch, struck back, and immediately the whole complexion of the war was changed. From that time the Allied cause never looked back, and the victorious armies of the Entente went on from success to greater success. Meanwhile, in the more remote theatres of war the enemy had been faring no better. In Palestine and in Mesopotamia the Turks and their German allies suffered overwhelming defeat. Bulgaria, yielding to continuous pressure, asked for a separate peace, and ceased to count in the war. Next the Turk recognised the hopelessness of his task, and in turn signified that he would be glad to get out of the war on any terms the Allies would grant him. No sooner was the collapse of Turkey assured than Austria followed suit, leaving the arch-criminal Germany alone to face the civilised world in arms. Then, less than two months ago, to our joy and relief, the Hun, after several attempts to deal with the Entente as an undefeated equal, at last recognised the logic of events and came as a suppliant for peace. How badly he needed it the terms of the armistice, to which he agreed with avidity, are sufficient witness. The surrender of a third of his war material, the handing over of two thousand aeroplanes and the dismantling of all his airships, the surrender of a fleet sufficient to make a first-class naval Power of the smallest South American republic, and the occupation of the Rhine bridgeheads, sufficiently indicate the measure of his defeat. It is true that the condition at the moment is not one of peace, but merely of suspended hostilities, but by complying with the armistice terms imposed by the Allies Germany has completely put it out of her power to resume the war, and we can thus say with the most perfect safety that THE WAR IS OVER.

In the midst of our thankfulness, and particularly at this, the dawn of a new year, and, as we all devoutly hope, that of a new era of peace and goodwill, it is well that we should think most of those of our gallant fighting men, whether of the Navy, the Army or the Royal Air Force, who have by their devotion and singleness of purpose given us the victory and a happy issue out of the most stupendous peril with which this Empire has ever been confronted. To them is the honour and to them belongs the glory of our victory, and to them our hearts go out in thankfulness. And in the fullest measure to those who have made the Great Sacrifice that we may live and carry on the great traditions of the British Empire —those traditions which were great enough and compelling enough to lead our gallant dead to lay down their lives that they might continue. It is a heavy charge that they have laid upon us, to preserve those things for which they died, but we have no fear but that those they have left will be equal to the task that lies before.

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The Royal Air Force

One of the closing events of 1917 was the issue of an Order in Council, applying the provisions of the Royal Air Force Act, and laying down the future constitution of the new Service. It was not, however, until April 1 that the Force actually came into official existence, with Lord Rothermere as the first Secretary of State for the Air. Prior to this—in February, to be exact—the first Air Force Estimates were laid before Parliament and passed. Being in a state of war, no figures were given, and thus to some extent the interest attaching to the event was very largely discounted. About the same time it was decided to form the Women's Royal Air Force, which has since grown so largely that it now has a total membership in excess of 23,000.

In April Lord Rothermere, to the great regret of all who had been associated with him in the administration of the Force, was compelled to resign from the post of Secretary of State, and was succeeded by Sir William Weir, who was shortly elevated to the peerage as Lord Weir. It was during the closing weeks of Lord Rothermere's term of office that the whole nation was set talking by the "affaire Trenchard," which has now, happily, been almost forgotten. This is neither the time nor the place to discuss the merits of an occurrence that is best buried in oblivion, and we have only referred to it in passing because it was one of the most important events in the early history of the R.A.F.

The R.A.F. having been constituted as a separate Service, on a par with the Royal Navy and the Army, it was felt that it should have its own media of recognition of distinguished service against the enemy, and in May His Majesty announced that he had been pleased to create a new series of decorations for officers and men of the R.A.F. Thus there came into existence the Distinguished Flying Cross and the Distinguished Flying Medal, to be awarded to officers and men respectively for gallantry in the

The fortress of Sveaborg (by Helsingfors) photographed from a German aeroplane. Note the channel in the ice kept clear by an ice-breaker.

face of the enemy, and the Air Force Cross and the Air Force Medal for distinguished services other than those performed in actual contact with the enemy. By this distinction a new precedent was established, which was very much to the good, whereby actual service in the field was differentiated from that behind the lines.

In June we first began to hear about the work of the "Independent Air Force," which, there can be no harm in stating now, was under the command of General Trenchard on the Western Front. Those of our readers who have closely followed the opinions expressed by FLIGHT will doubtless recollect that from the very first, during the discussions on the subject of a separate Service, we advocated the formation and use of a strategic wing, whose duties would lie altogether apart and distinct from the tactical work carried out by the squadrons attached to our armies actually in the field. Such an independent body, in fact, as the "I.A.F." was ultimately constituted. It is impossible to say to what extent the work of the I.A.F. and the literally numberless raids carried out by its units on German towns and strategic points far behind the enemy lines helped towards the final victory, but we know from the tone of the enemy Press and the squeals for mercy that went up as soon as the Force got really to work that its contribution to the combined effort produced a profound effect on the enemy's *morale*.

In the wider issues of the war, it is hopeless to even attempt to assess the value of the work of the R.A.F. Quite early in the year it had established a very definite superiority over the enemy, both in the quality of *personnel* and in technical efficiency, a superiority that became more marked every week, until at the end the enemy was at his wits' end to find means for countering the aerial offensive. It is certainly no detraction from the work of other arms of the Services to say that without that aerial superiority which was so well established and maintained we should not have had peace this year.

As to the future of the R.A.F. we cannot speak now. We have stood and still stand for a supreme British Air Service, because we believe that our future as an Empire lies as much in the air as on the seas. To what extent these views are shared by those who will hold our destinies in their hands in the future we cannot say. Already there is talk of reducing the R.A.F. and of making it once more a perquisite of the War Office. Reduced it may be for a time, but that it can again pass under War Office control to be a mere adjunct of the Army is unthinkable.

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New Aircraft Types

We have always made it a practice, when reviewing the events of the closing year, to make a brief reference to new types of aircraft evolved in the meantime. The war necessarily sealed our lips as to this phase of development, and although we are not at peace, in fact, though still technically in a state of war, the armistice is of too recent a date and the censorship still too active to permit more than a passing glance at what has happened in this direction during 1918. As in the previous years of war, we have been able from time to time to publish certain constructional details of captured enemy machines, but as to our own designs they have quite rightly been forbidden except where the descriptions have appeared in enemy publications. That being so, it is impossible to outline comparative progress, and to attempt to pass judgment would be useless. We can thus only generalise, with the hope that shortly we may be able to speak freely of what has been done during the five years that will have elapsed, and to draw useful conclusions from the review. As it is, we can only say that progress generally has been in the direction of larger machines and bigger, more efficient engines. For reasons that, fortunately, do not matter now, we were not able to see how the great production schemes of our American Allies were likely to affect the war and to influence future design. The daring experiment of standardising an engine for war use certainly succeeded in so far as it produced a motor which every one assures us is a really good one, but the end of the war has made it impossible to say how far the stagnation of design inseparable from standardisation would have affected comparative efficiency.

Without the American programme, however, we have more than held our own in the air. In fact, as we have said previously, we were able, thanks to the wonderful speeding up of production, to establish a very definite ascendancy over the enemy. Our machines, generally speaking, were faster, more efficient and much better constructed than those of the Germans. Several types of large bombers were evolved for the use of the Independent Air Force, and did excellent work in Germany and behind the enemy's lines. Even larger types had been produced for the express purpose of bombing Berlin and the inland towns of Germany. These were ready and waiting for favourable conditions when the armistice was signed, else the German capital would undoubtedly have undergone the experience that became familiar to Londoners in 1917 and to a lesser extent this year.

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The Dirigible

So far as we know, there has been very little development of the dirigible in Germany. The heavy losses sustained by the Zeppelin fleet in 1917 were not encouraging to the enemy, though he still seemed to pin his faith to the giant rigid for certain purposes. That faith was not completely shattered by the disaster which practically wiped out the whole of the available fleet in October of 1917, but it is significant that the Germans have made no really serious attempt to raid these shores by airships during the year which is now ending. Nor has there been the same talk of giant super-Zeppelins to be built for the undoing of their enemies. Still, a certain amount of progress has been made and improvements both in endurance and the capacity for reaching very high altitudes have been made, but these have been, so to say, more of routine development character than associated with new discovery.

In this country we have done a great deal of work in the development of the airship, both the large rigid and the smaller non-rigid types. In particular, a very large number of the latter have been added to the fleet and have done admirable work in anti-submarine patrol and the convoying of ships in home waters. It is still too early to speak with exactitude of what has been done, but we know that the sum total of the progress achieved has been very large. It is permissible to hope, now that no information can be of value to an enemy, that before long the Air Ministry will release for public information the results of the development work which has been

accomplished during the war, and particularly in the course of the past year.

Raids: Enemy and Allied

The year 1917 saw the activity of the Germans, in so far as concerns air raids on this country, at its maximum intensity. Bearing in mind the occurrences of that year, we certainly thought that 1918 would not be one whit behind the record of its predecessor, but, contrary to all expectation, we have really had a comparatively peaceful time. Sporadic raids were carried out during the first few months of the year, the worst, from the point of view of loss of life, being that of January 28, when several machines reached London, and bombs were dropped in central districts, killing 47 and injuring 169 people. Raids were fairly frequent up to the end of March, when the German offensive opened, and gave their air service more useful work to do than baby-killing in English and French towns. The last raid on London took place at Whitsuntide, but the invading machines suffered such heavy losses that the enemy command evidently came to the conclusion that the game was not worth the candle. By this time, too, we had begun to give full effect to the policy of reprisals, and the Independent Air Force was giving the towns of the Rhineland far more than the enemy was in a position to return, with the consequence that a suggestion came from the German side that the bombing of towns outside the war zone should cease. Needless to say, the proposal met with scant attention from the Allies. The real reason for the squeal must be sought in the fact that Allied air supremacy was by this time so well established that Germany had begun to recognise the inevitable. Machines, and, above all, the best pilots, that would have been employed over the lines in France, had to be retained at home for the defence of German towns, and there were thus fewer pilots available for long-distance bombing expeditions. Thus, the claim made early by the enemy that the raiding of open towns achieved a direct military result by causing the detachment of men, machines and guns from the front for home defence recoiled with force on his own head.

Although London has not done so badly in the matter of hostile raids, thanks to the factors we have noted, and to the high pitch of excellence to which the defences were latterly brought, there have been frequent attempts made to raid the coast towns, but in very few cases have they met with anything like real success. In fact, not the least disappointment the Hun has sustained in a year of bitter disillusionment must have been the utter failure of his aerial frightfulness, in combination with the full measure of his own medicine with which the Allied air services have dosed him in turn.

It would be an utterly hopeless task to endeavour to traverse the aerial activities of our own R.A.F. and the Allied air services generally. Indeed, we have long ceased to try to keep count even of the number of raids carried out behind the German lines. They have been almost literally as the sands of the seas, and their effect on the result of the war has been incalculable. At the end of 1917 we were only able to say that our counter-raids were, so far as the policy had been developed, confined altogether to points of military importance. The formation of the Independent Air Force was collateral with a change in the basic policy. True, objectives of military value were still the principal care of the I.A.F., but the Rhineland towns, which were of immense importance to the enemy either as concentration points for troops or as munitions centres, were regularly and persistently raided, and a great deal of damage, both moral and material done, with, as we have already said, an effect on the issue of the war which can never be calculated, but which was undoubtedly very great.

The Roll of Honour

Unfortunately, our victory has not been won without a deplorable sacrifice of life. The casualty lists of the R.A.F. have been appallingly heavy, but not more so than we should expect them to be when the character of the work in which our pilots have been engaged is borne in mind. In fact, proportionately to the growth of the Service and in the intensity of the aerial war, it is very probable that they are lighter than in any previous year of the war. Again, it has to be recorded that in spite of the perilous nature of the duties demanded of the officers of the R.A.F., there has been no more difficulty in securing the requisite number of volunteers to fill the gaps caused by our losses, and at the same time to provide sufficient for the enormous expansion of the establishment. The main difficulty has been in the selection of the best from among the huge numbers who have offered themselves for service in the R.A.F., which has become the most popular of all the Services among the promising youth of the country. That it will remain so, provided there is no post-war tinkering with its status, we are very fully assured.

The Royal Aero Club

Necessarily, the Royal Aero Club has again found its activities limited to its social functions, which, be it said, it has developed and carried out with conspicuous success during the year. That it intends to remain a force in the future of aviation is evidenced by the instant announcement made by the Club on the signing of the Armistice to the effect that the prize for the first Atlantic flight had been re-opened for competition. We have no doubt that this is but the first earnest of its return to active life as the promoter and governor of the sporting and development side of the movement, and in that *role*, needless to say, we wish the Club all success.

The Year in Industry

It may be said that the industry has played a part in the war during the year that is second only to the magnificent record of our flying men at the front. What has been done in speeding-up production cannot be told yet, since it must be a matter of time to co-ordinate the figures, but when these are available they will, we fully believe, read more like a fairy tale than sober fact. We do not even intend to make an estimate of the proportionate production achieved at the end of the war as compared with a year ago, but it is enormous, and the country owes a deep debt of gratitude to all concerned in the industry for the Titanic efforts they have put forth during the past twelve months—efforts which, it is not too much to say, have done as much as anything, save the valour of the fighting men, to make victory certain.

There have been incidents, though, that would be better forgotten. Of vexatious strikes and labour troubles arising out of the most trivial causes, and which have tended to hold up production to an extent that might have been dangerous had they spread. Fortunately, the heart of labour has been sound at the core, and none of these troubles has had

more than local significance. London, Coventry and the North have had their share of these troubles, some of which looked grave at times, but were nevertheless successfully smoothed away before they caused more than temporary inconvenience. That being so, we can agree to let bygones be bygones, simply contenting ourselves with the remark that we regret exceedingly that there have been a few units among labour which have done their best to give the whole a bad name.

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Technical Progress From a technical point of view, the progress made during the year that is just closing has been excellent. This applies not only to the aeroplanes themselves and their engines, but also to the production side of the question, which latter has progressed to such an extent that at no time during 1918 has our supremacy in the air been seriously in danger. Technically, and by that we mean the mechanical excellence of our engines, the structural and aerodynamical qualities of our machines, and the skill and daring of our pilots, we have never been behind the enemy, or at least not since the earlier part of the war. There have been times, it is true, when we have not had at the front a sufficient number of our latest and best types wherewith to meet a concentration of the best enemy type of that time, but this has not been on account of any shortcomings in the machines we actually then possessed, but solely a matter of quantity production. It is gratifying to be able to state, that during 1918, the production in quantities has attained a standard which is on a level with the mechanical excellence of our planes and engines, so that this year has been marked by a decided supremacy all round, not only in quality, but also, as pointed out, in quantity.

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Engine Development As regards the development of aero-engines, this has been marked during the year by an increase in power, and by a general improvement as regards reliability. The increase in power has been attained along two distinct lines. One of these has been the detail improvement and refinements which have resulted in a considerable increase in power of the engines already in existence, and the other has been in the nature of new designs. As an example of the former, we may refer to the Rolls-Royce figures published in our issue of last week, which showed an increase, in the case of the "Eagle," of from 266 h.p. in March, 1916, to 360 h.p. in 1918. Similar results have been obtained with other makes of engine.

In the matter of new design, the increase in power brought about by the demand for larger engines, is illustrated by such engines as the Rolls-Royce "Condor," the Siddeley "Tiger," and the Napier "Lion," to mention just a few that come to mind. Apart from the larger engines that have come into being during the year, new types have been developed which have given promise of extraordinary things in the way of power for weight. Thus, we may refer, to take only one example, to the A.B.C. engines, which have, probably, the greatest power for their weight of any aero engine in the world. Since, however, these engines have not, as yet, been employed in great numbers on the Western front, we shall refrain from referring to them in detail. Suffice it to say that it was with one of the A.B.C. engines that a Sopwith "Snipe" attained the extraordinary speed of 156 m.p.h., and a climb to 10,000 ft. in 4½ minutes. With all due respect to the excellent qualities of the "Snipe," it is doubtful if it could ever have put up such a performance if fitted with any other engine.

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Aeroplanes In the matter of aeroplanes, the development has, generally speaking, been in the direction of an increase in size all round. This has been occasioned by the employment of larger engines, with consequent greater engine weight, which has called for an increase in area if the landing speed is to be kept down to a reasonable figure. In the single-seater class, the development has been from the Sopwith Camels, and a few Sopwith triplanes early in the year, the Spads, the S.E.5's, and S.E.5A.'s, and, possibly, a small number of de H.5's, to Sopwith Dolphins and Snipes to Martinsydes, and with a reversal in size in the case of the diminutive Bat.

Of the two-seaters, there were in use early in the year a considerable number of R.E.8's, Bristol Fighters, de H.4's, with a few F.E.'s used for night bombing. These have gradually been supplanted by higher-powered machines, such as the later Bristol Fighters, de H.9's, and A.W.'s.

In the twin engine or multi-engine class, there has been an increase in size in the case of the Handley-Page, which has grown from a twin engine bomber of about 100-ft. span to a four-engined giant with a span of about 130 ft. Of the smaller twin-engine bombers designed to be fast as well as good weight carriers, we have had such machines as the Vickers Vimy and the de H.10A, the latter of which was illustrated in our last issue, and which has an extraordinarily good performance.

In the way of armoured machines, excellent progress has been made, although the latest of these was not put into production in time to show its merits before the Armistice was signed. We are referring to the Sopwith Salamander, with B.R.2 engine, which would undoubtedly have played an extremely important part in the fighting, as it can fly at so low an altitude as 100 ft. in comparative safety against machine-gun fire.

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Seaplanes Little has been permitted to be known with regard to the development of our seaplanes, but, apart from the use of land machines starting from a ship, our large seagoing flying boats have rendered excellent service, while the development of torpedo planes has progressed favourably. When it becomes possible to disclose particulars, we hope to publish some interesting information regarding the development of seaplanes and flying boats.

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Airships The secrecy which has surrounded the work of our seaplanes has also thrown a veil over the doings of our airships, but when information regarding these becomes available, it will, we think, be found that our lighter-than-air fleet has done excellent work, and that technically the airship design has reached a very high standard, both as regards the small non-rigid type and in the way of the larger rigid airships. The information that has been obtained, and the data compiled will certainly be found most useful when applied, as we hope it will be, to the development of the post-war commercial airship, for we firmly believe that this type of craft will play its part in commercial aviation alongside with the commercial aeroplane.

FLIGHT

THE L.V.G. TWO-SEATER BIPLANES

[*Issued by Technical Department* (*Aircraft Production*), *Ministry of Munitions.*]

(*Concluded from page* 1431.)

Wing Construction

(THESE details were all noticed in the C.VI. machine, as in the earlier type the planes are still covered with fabric.)

Both front and rear spars are of the box type, and wrapped with fabric. Sections drawn to scale are given in Fig. 8, but these drawings do not show internal construction, as the spars have not yet been divided.

The overall height and width of each spar, taken respectively parallel and perpendicular to the vertical walls, are :—Upper plane, front spar, height $3\frac{1}{4}$ in., width $1\frac{7}{16}$ in. ; rear spar, height 3 in., width $1\frac{5}{16}$ in. ; lower plane, rear spar, height 3 in., width $1\frac{1}{16}$ in. ; front spar, height $2\frac{7}{8}$ in., width $1\frac{1}{16}$ in.

It has been possible to draw a section of the front spar of the C.V. machine, and the result is given in Fig. 9. There is every reason to believe that all the other spars of the L.V.G. are of similar construction. Fig. 10 shows a crude but effective method of repairing a broken spar. The repair was carried out by the enemy, probably in the field.

The leading edge is of the customary C section, and is followed at 7 in. interval by the front spar. The space between the two spars—$25\frac{3}{4}$ in. wide—is braced with cables and piano wire, and contains four ash compression struts of I section, which are simply butted into sockets obviously intended to carry steel tubes. (These compression struts are steel in the C.V. model.) The distance from the rear spar to the wire trailing edge is 2 ft. $6\frac{3}{8}$ in. The ribs, of which a section is shown, are of the usual type, and are spaced at intervals of $16\frac{3}{4}$ in., centre to centre. They are unlightened. Equally between them are placed two false ribs—mere strips of wood let into the leading edge and tacked to the spars. These false ribs have floating ends $7\frac{1}{2}$ in. behind the rear spar.

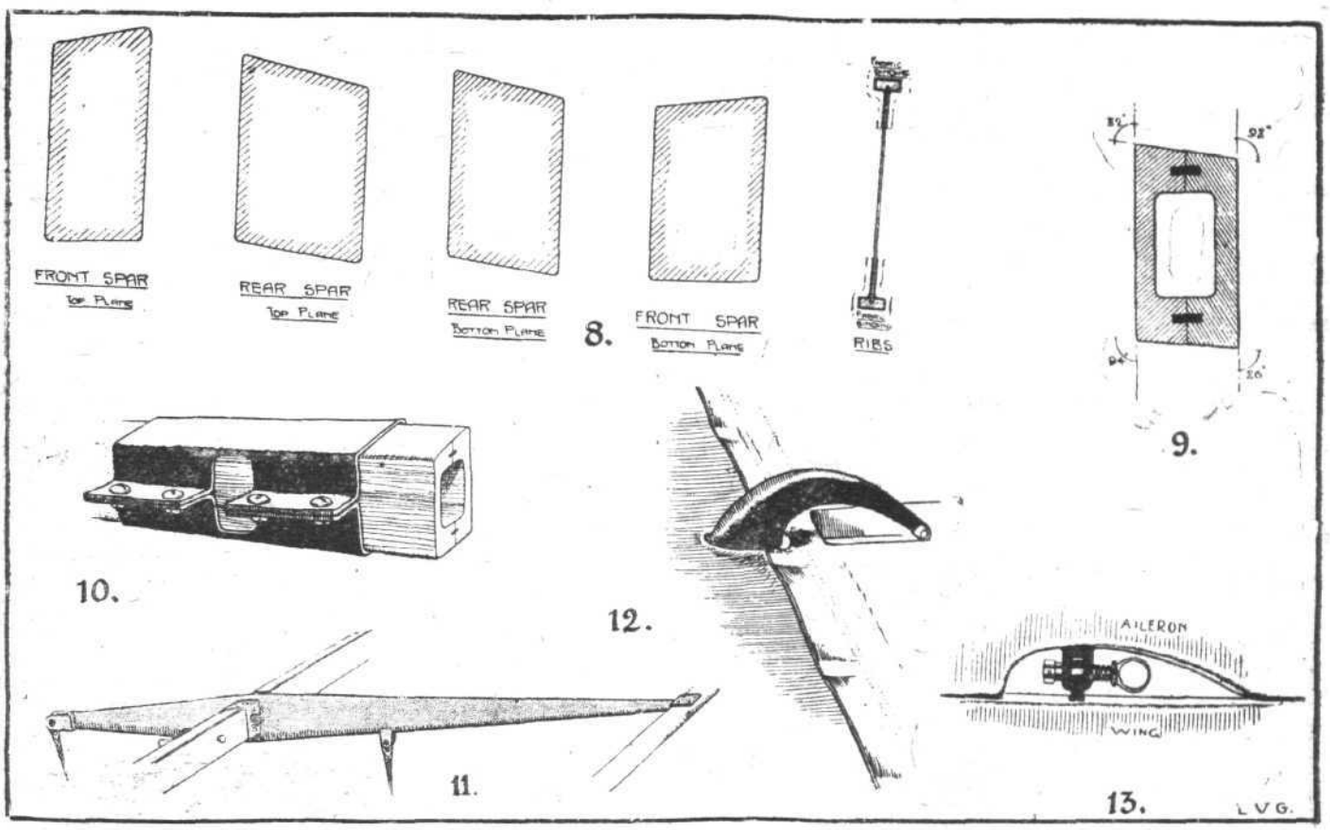
The construction of the lower plane does not differ from that of the upper plane just described, except that the false ribs are not found in it.

Ailerons

The *ailerons* of the L.V.G. no longer possess the peculiar step in the trailing edge that has for so long been associated with the design, and the *ailerons* are rather different in the two types. The C.V. model has *ailerons* which are balanced while those of the C.VI. are not. The respective areas are given on the first page of the report. With regard to the constructional features, only those of the later type can be described. The whole construction is of wood, with the exception of the *aileron* lever, a sketch of which is given (Fig. 11). This is of the usual curved type in the C.V. machine (see Fig. 12), but is made to serve as a rib also in the C.VI. type. The wooden ribs, together with the wood leading and trailing edges, form a structure which is very light. Both machines have the *ailerons* hinged to a false spar some distance behind the rear spar, and the hinges are all of the type that has already been described in connection with the wing attachments (see Fig. 13).

Struts

The L.V.G. is one of the few enemy aeroplanes that employ interplane struts of wood. They are of the shape shown in Fig. 14, and are of streamline section ($2\frac{1}{4}$ in. × $1\frac{9}{16}$ in.), slightly hollowed out for lightening purposes. Fabric is wrapped round the strut in three places, and the form of the strut sockets is made clear in the sketch (Fig. 14), which shows one of the C.V. struts.

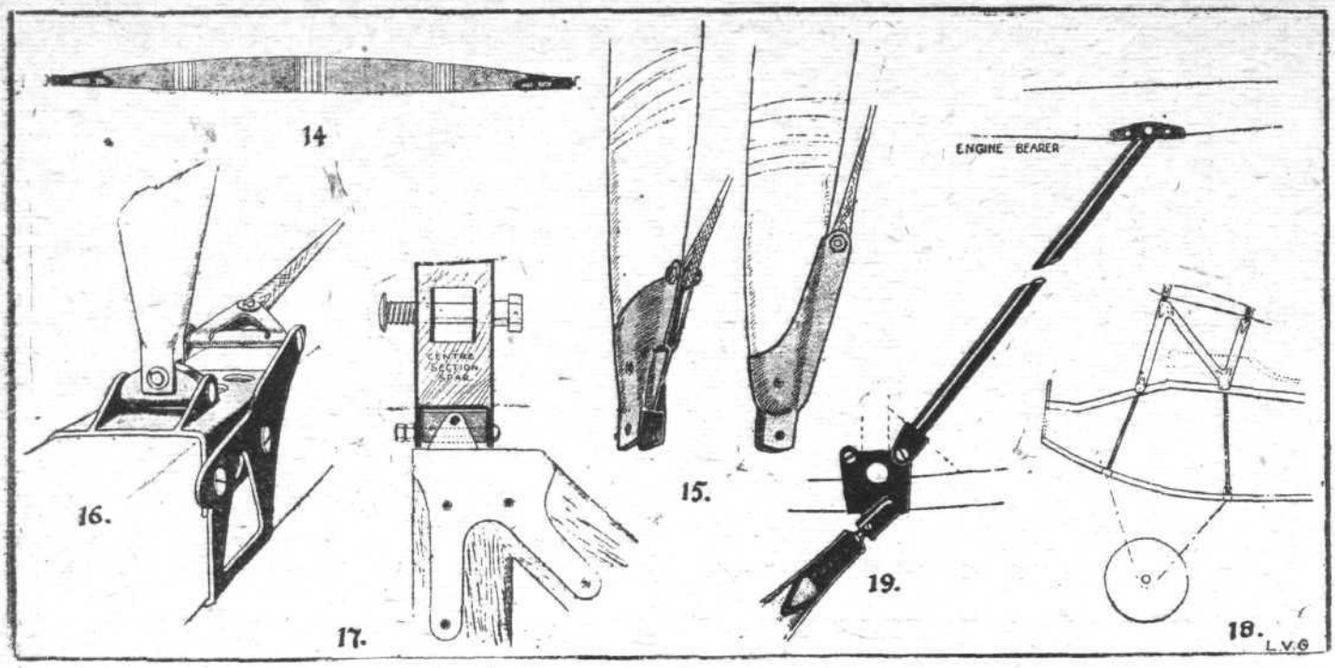


L.V.G. Constructional Details.—8. C.VI. wing spar sections ; 9. Front spar section of C.V. ; 10. Field repair of broken spar ; 11. *Aileron* crank of C.VI. ; 12. *Aileron* crank of C.V. ; 13. *Aileron* hinge of both types.

The types of strut socket employed in the C.VI. machine is shown in Fig. 15, while Fig. 16 shows how the strut is attached to the spar. The socket is held in place on the strut by simply inserting a suitable length of steel tube through a drilled hole in socket and strut and riveting over the ends.

As has already been mentioned, the centre section struts are different in the two types. In the C.V. machine the *cabane*, the shape of which is made clear by the G.A. drawings, is made of streamline steel tubing. This has been changed, and the C.VI. model has parallel centre section struts of wood, which are like the letter N when seen from the port side. Fig. 17 shows the joint between the spar of the centre section and the strut. The unusual arrangement of the cross-bracing of this centre section should be noticed in the front view, G.A. drawings.

The line of the front limb of the N is carried on by the third *fuselage* bulkhead, and finishes at the front joint of *fuselage*



L.V.G. Constructional Details.—14. C.V. inter-plane strut ; 15. C.VI. inter-plane strut socket ; 16. Attachment of strut to spar ; 17. Attachment of centre section strut to spar on C.VI. ; 18. Centre section struts and bulkheads of C.VI. ; 19. Bracing tube between rear chassis strut and engine bearer on C.V.

and undercarriage. The angle between the rear two limbs of the N is practically bisected by the line of the fifth bulkhead, which finishes at the rear joint of *fuselage* and undercarriage. This is shown by a diagram, Fig. 18. The C.V. machine has a sloping steel tubular strut between engine bearer and rear undercarriage attachment (see Fig. 19), but by the rearrangement of bulkheads the necessity for this has vanished, and the strut is not found in the later model.

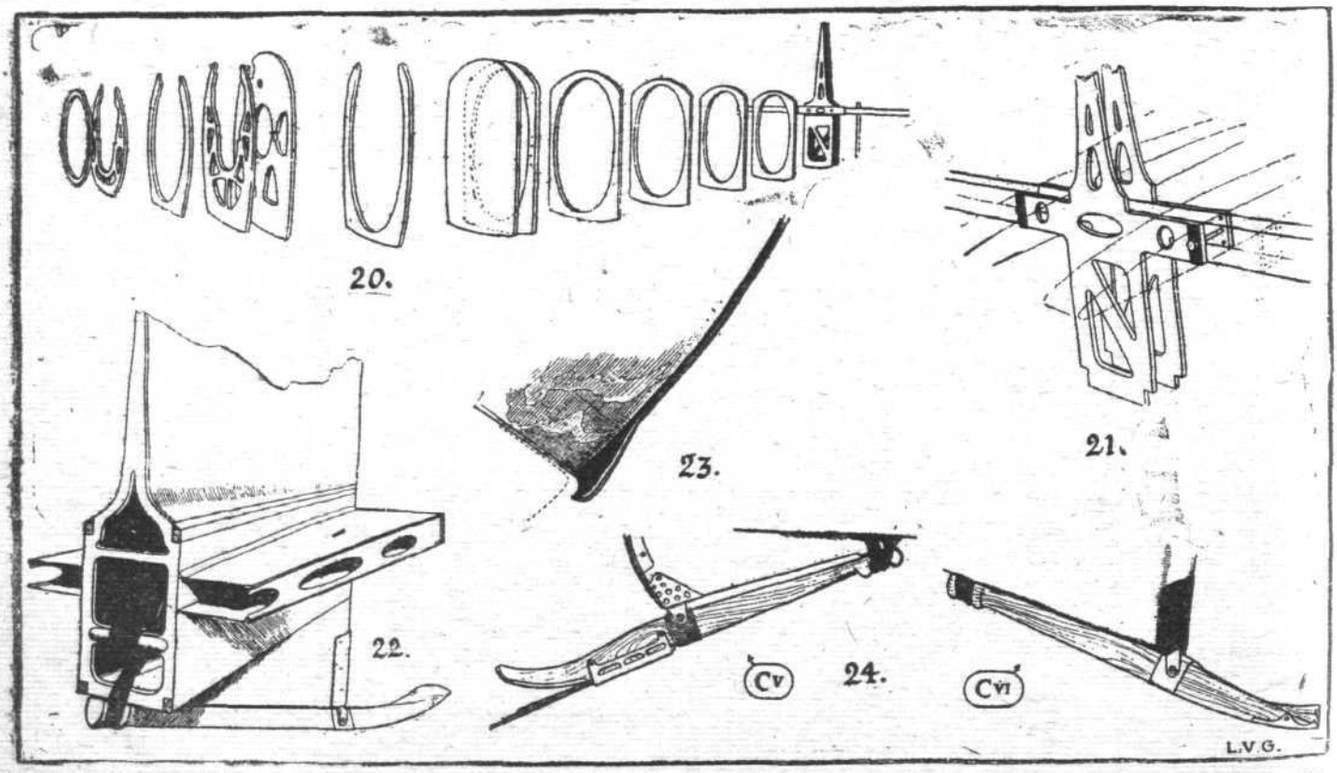
Fuselage

The earlier types of L.V.G. had bodies built on the cross-braced girder system. Both the machines described possess the same type of *fuselage*, totally different from the girder system, viz., a framework of bulkheads and *longerons*, covered with a thin layer of 3-ply and totally without wire bracing. Fig. 20 gives the number of shapes of the bulkhead in the C.V. machine, and incidentally reveals the shape of the *fuselage*. The C.VI. type has generally the same arrangement, but the third and fifth bulkhead are no longer vertical in this model, and the tail part of the body has been strengthened by the insertion of another cross piece.

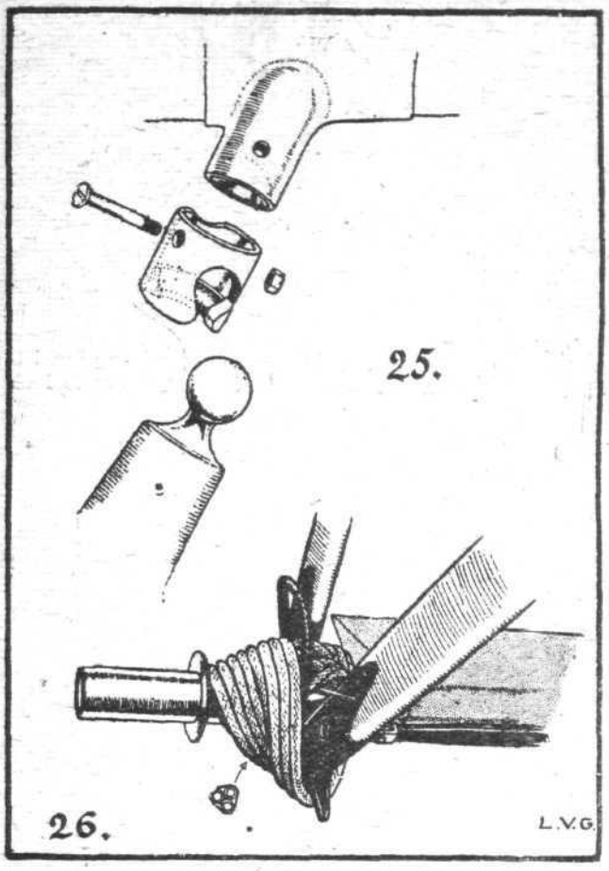
Although the *fuselage* of the L.V.G. biplane ends in a vertical wedge, the provision of a centre section for the tail plane gives a cruciform appearance to this part. This is shown clearly by Fig. 21, where the two sides of the tail plane centre section are drawn in thin lines. The 3-ply covering to the *fuselage* rounds off the joint of body and tail plane in the neat way that is found in so many German aeroplanes. (See Fig. 22.)

Tail

The shape of the fixed tail planes is shown in the G.A. drawings. The main box spar (see dotted section in Fig. 21) passes right through the body. The rear spar, to which



L.V.G. Constructional Details.—20. The bulkheads of the C.V. *fuselage* ; 21. Mounting of the tail plane ; 22. Stern of *fuselage*, showing plywood covering and mounting of tail skids ; 23. Protection piece for balanced portion of elevator ; 24. Tail skids of the two types.



25 and 26. Undercarriage details.

the elevators are hinged, is of rectangular section wood, hollowed on its rear face to take the steel tube which serves as the elevator spar. The tail is so badly damaged that detailed analysis is impossible, but the fixed tail planes are of wooden construction, with the usual ribs and semicircular leading edge. It will be noticed that the tail plane is not set parallel to the crankshaft line, but is raised through an angle of 5°, and it has a symmetrical streamline section.

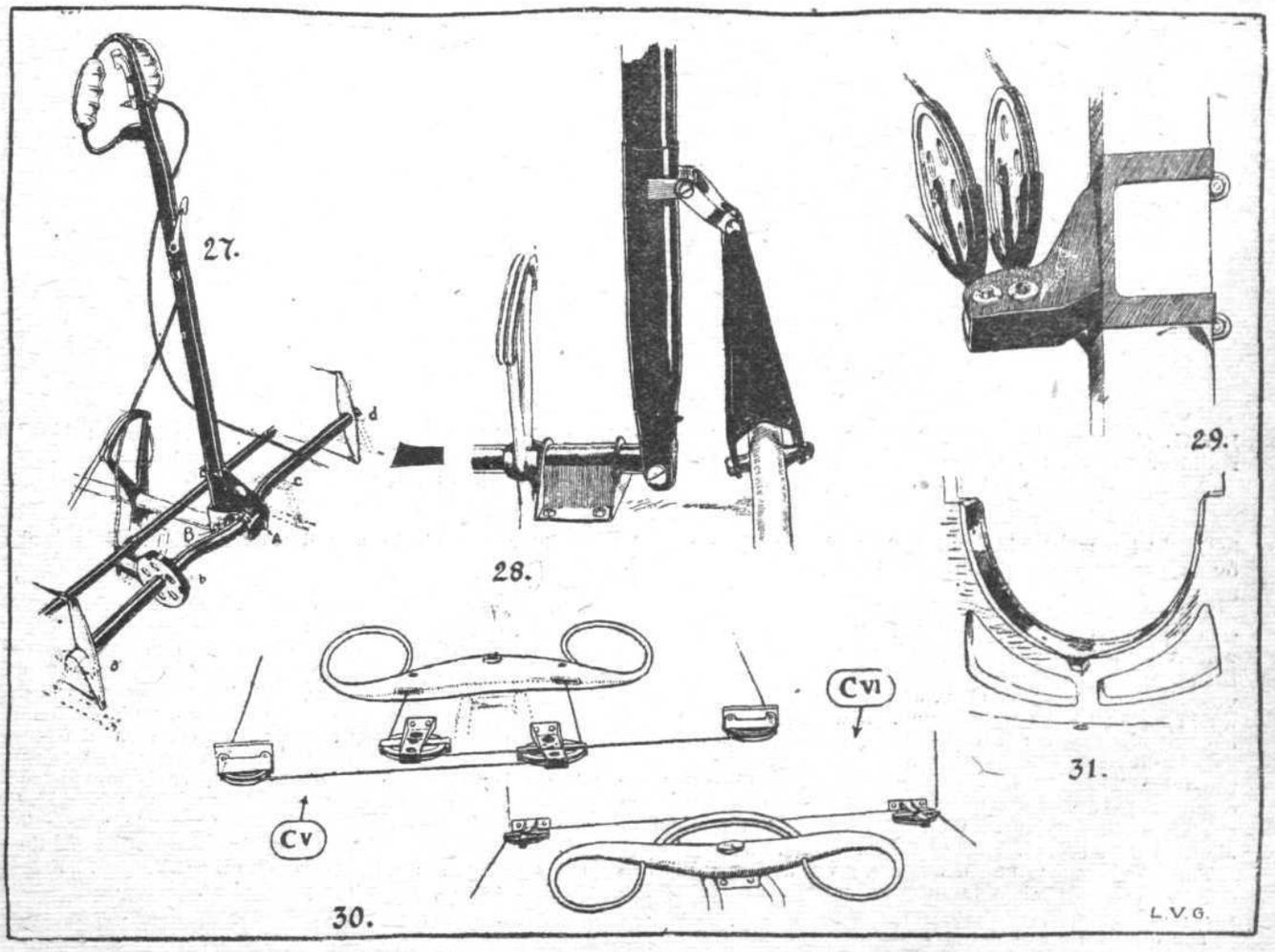
The elevator, which is balanced and undivided in both models, is a welded structure of light steel tubing, and presents no unusual feature. There is a small protecting horn provided on the tail plane, to prevent damage to the corner of the balanced portion of the elevator—Fig. 23 gives a clear idea of this example of thoroughness.

The tail skids are both of the same general type as that of the Pfalz Scout, *i.e.*, the member is entirely exposed, and does not project into the *fuselage*. It is of ash, and the upper end is so shaped as to avoid the necessity for any metal link or fitting. Both machines also have a small triangular fin on the underside of the *fuselage* which serves the double purpose of providing fin area and of adapting the shape of the *fuselage* to the slope required for the tail skid. (See Fig. 22.)

It will be seen from the sketch (Fig. 24) that the skid of the C.V. machine carries a four-leaved flat spring bolted a little to the rear of the pivot. In the later model this has been discarded. The shape of the lower triangular fin also differs slightly—that of the C.VI. has been simplified and strengthened. The workmanship of the sheet steel angle piece on the C.VI. machine gives one the impression that it is a "squadron fitting." It is of fairly heavy gauge, and may have replaced a weaker part fitted by the manufacturer.

Undercarriage

The landing gears of both machines are similar, and in general arrangement conform to the practice that is now practically standard. The vee struts are of streamline section, and constructed of fabric-covered wood. The practice of using wood for undercarriage struts is, of course, unusual in enemy machines, but is in conformity with the other struts—interplane and centre section—on this machine.



L.V.G. Constructional Details.—27. Controls of C.V.; 28. Details of C.VI. controls; 29. *Aileron* pulleys; 30. Rudder bars of the two types; 31. Aluminium strip protectors of bulkheads against oil.

The major and minor axes of cross section of one of the front struts (and all four, front and rear, are of equal dimensions) are respectively $2\frac{9}{32}$ in. and $4\frac{7}{8}$ in.

The upper and lower extremities are capped with steel sockets, which allow of attachment to the *fuselage* at the upper extremities and at the lower ends serve to connect the two limbs of the vee, and are provided with accommodation for the shock absorber. Figs. 25 and 26 show respectively the component parts of the attachment to the *fuselage*, and the socket at the lower part of the vee. From Fig. 25 it will be noticed that the ball at the head of the strut beds into a hemispherical socket attached to the *fuselage*. The lower half of the ball articulates with a curved surface on the ferrule, and the ferrule next slipped over attachment. In assembling this joint—and this is a matter of seconds only—the ball is first passed through the opening provided on the ferrule, and the ferrule next slipped over the body lug and pinned in place. All four body attachments are of this type in the C.VI. machines, but in the C.V. model the joint was made by simply pinning the ball to its socket, without the refinement of a ferrule.

The shock absorber is of the coil spring type, with three small diameter springs lying side by side, as indicated in Fig. 26. A loop of cable limits the amount of axle travel, and between the lower extremities of the vees is a steel compression tube, of $1\frac{1}{2}$ in. O.D., and behind this lies the axle, which is encased in a 3-ply fairing. It will be noticed that the compression tube is not included in the fairing, and when the axle is raised as the machine lands, the fairing travels with the axle. This method allows of good accessibility to these components, but is not quite so good an arrangement from the streamline point of view as the common method of allowing the axle to lift out of a fixed fairing.

The schedule of principal weights, given at the end of this report, is of considerable interest as regards the undercarriage.

The wheels are 810 × 125, and the track 6 ft. 7 in. The cross bracing does not start from either front or rear *fuselage* attachments, but from the front spar joint on the *fuselage*.

Controls

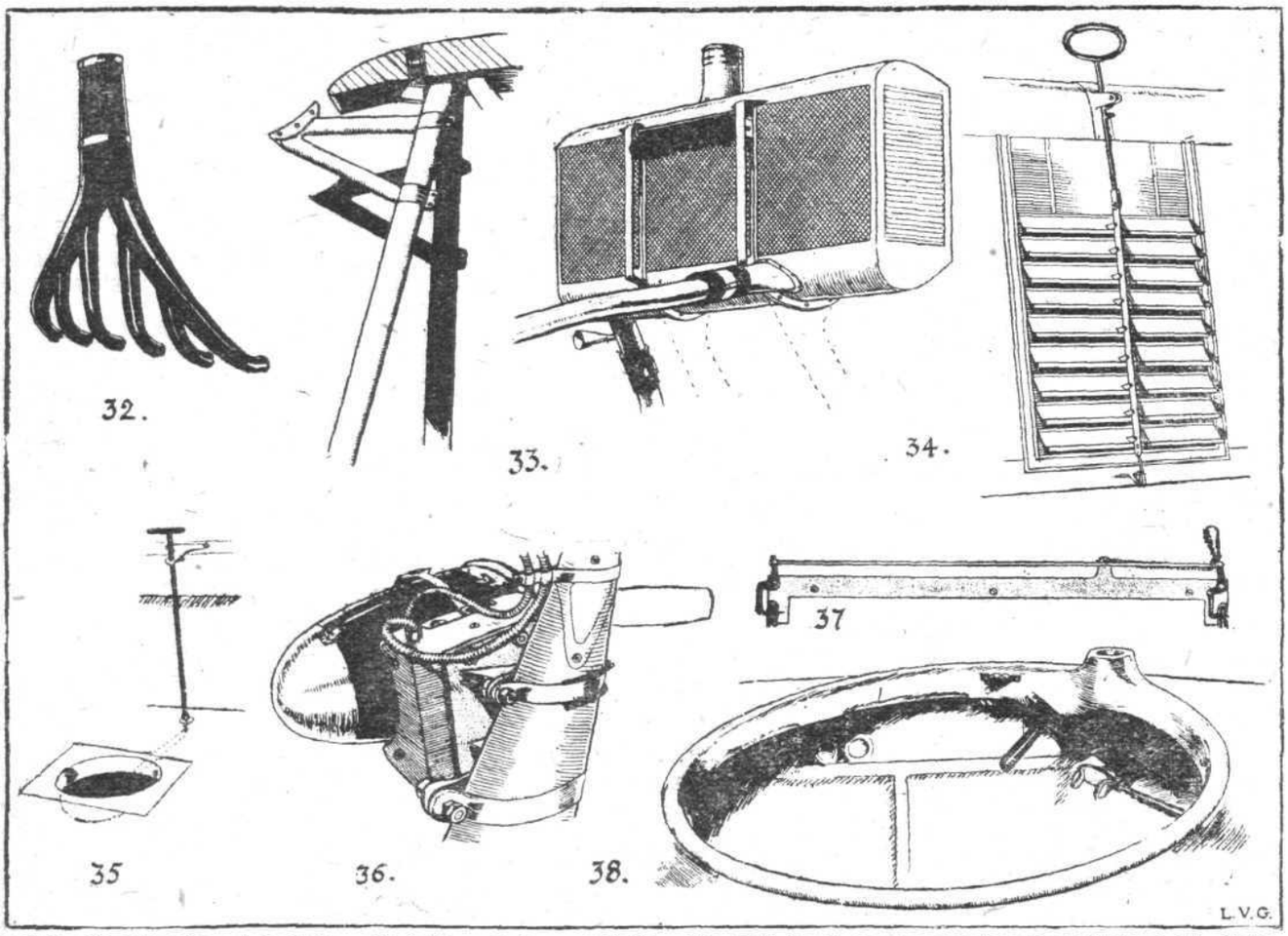
As is the case throughout the design, the controls of the two aeroplanes are generally similar, but differ in detail. In the C.V. machine, the control lever, at the head of which is the usual two-handed grip, operates two rocking shafts which are perpendicular to one another. The transverse tube, which actuates the elevators, is cranked in the middle and supported on four brackets, marked a, b, c, and d, in Fig. 27, which act as bearings. To the middle point is pinned the front half of the jaw which is found on the bottom of the control lever. This pin A, always points directly to the centre of the pin B, which passes through the rear half of the jaw and is itself always exactly in line with the bearing of the transverse shaft. This somewhat complicated arrangement allows the transverse shaft to be rotated round axis a, b, B, c, d, and at the same time permits the other shaft to rock on its own bearings. A simple contracting band brake controlled by a Bowden lever and cable serves to lock the elevator controls in any desired position. This brake is found in both types.

The C.VI. controls are rather different, and are shown in Fig. 28, which clearly explains their operation. The naked *aileron* control cables pass through the lower wing near the rear spar, and run over the aluminium pulleys illustrated in Fig. 29. The upper extremities of these cables are attached to the welded control lever which works in a slot in the upper plane. The differences between the two types in the matter of the *aileron* lever has already been commented upon.

The rudder bars of the two types are of the same general design, but the problem of leading the cables round the base of the large petrol tank immediately behind the rudder bar, is solved in different ways. In the later type, a semicircular extension to the rudder bar avoids the necessity for the two extra pulleys and bearings found in the C.V. type. Reference to Fig. 30 will make this point clear.

Engine Mounting and Control

The 230 h.p. Benz engine is mounted on wooden bearers of rectangular section, $1\frac{5}{8}$ in. wide and $3\frac{1}{4}$ in. deep, supported



L.V.G. Constructional Details.—32. Exhaust pipes of C.VI.; 33. C.V. Radiator supports and radiator; 34, C.VI. radiator shutter; 35. Camera hole and cover of C.V.; 36. Wireless generator mounted on chassis strut of C.VI.; 37. Release gear for unknown object on C.V.; 38. Gun ring of C.VI.

on the cross bulkheads found in the front of the *fuselage*. In the C.V. machine there is a steel tubular strut on each side which is in compression between the rear portion of the engine bearer and the front undercarriage joint (see Fig. 19). As has already been mentioned, the rearrangement of the *fuselage* bulkheads allows this strut to be dispensed with in the C.VI. model.

The throttle lever is of the familiar ratchet-quadrant type, and in the C.V. machine there is no interconnected throttle lever on the control stick. Although the C.VI. control lever is missing, it is fairly certain that this is true of this type also. Those bulkheads which are likely to receive oil drippings from the crankcase are protected by aluminium strips employed in the manner shown in Fig. 31.

Oil and Petrol Systems

Both machines have a main petrol tank under the pilot's seat, and a gravity tank attached to the upper plane. In the C.V. machine this tank is placed on the upper surface of the port plane, alongside the narrow centre section. The later type has the tank beneath the port upper plane, as will be noticed from the scale drawings. In this case the filler passes through the plane, and has the cap on the plane's upper surface.

The C.VI. main tank has a capacity of 47 gallons, and the gravity tank a capacity of 5½ gallons, thus giving a total petrol capacity of 52½ gallons. There is a hand petrol pump which allows the pilot to fill the gravity tank from the main tank, and an engine petrol pump which draws fuel from the main tank and passes it on under pressure to the small cylindrical compartment of the main tank, whence it flows to the carburettor. This is, of course, the usual Benz system, and has been fully reported upon.

The exhaust pipes are of welded sheet steel, and are carried higher than is usual in the C.VI. model (see Fig. 32).

Radiator

The positions respectively occupied by the radiators of the two models are quite different, though both are in conformity with enemy practice. Reference to the scale drawings will make it clear that the C.V. radiator is supported in front of the leading edge of the upper plane on struts clamped to the *cabane*, while that of the C.VI. occupies the middle part of the centre section and is flush with the curvature. The construction also differs. The vertical (C.V.) radiator is composed of flat vertical films, which are crimped and set "staggered" so that their appearance is similar to that of a honeycomb radiator. The C.V. type has the usual oval section brass tubes running perpendicular to the chord of the wing. Fig. 33 gives a sketch of the earlier radiator, and of its supports. The shutters work on different systems, as will be noticed from the sketches. The vertical shutter of the C.V. machine is of the roller blind type, with cables which operate positively, one to unroll and the other to roll up the blind. This shutter puts out of action approximately one-third of the radiator area. The C.VI. shutter effect is obtained by moving a handle which alters the slope of nine parallel hinged flaps, as illustrated in Fig. 34.

Instruments

The pilot's cockpit is not provided with a dashboard, but the instruments are distributed chiefly on the left-hand side of the pilot. They comprise the usual Bosch starting magneto and key switch; an oil-pressure gauge calibrated to 4 kg. per sq. cm.; a petrol-pressure gauge to ·5 kg. per sq. cm.; a Maximall petrol gauge to the main tank, a grease pump, and throttle and ignition levers of the usual type.

The observer's cockpits of both machines are provided with circular camera holes in the flooring, and each hole is fitted with an aluminium cover, but these covers are manipulated differently. The aperture of the C.V. machine is about 9 in. in diameter, and the type of cover is clearly shown in Fig. 35. That of the C.VI. model is 12 in. in diameter, and is covered simply by an aluminium sheet which slides in parallel grooves outside the *fuselage*. The C.VI. biplane was fitted with a complete wireless outfit when captured, but of the internal fittings only the aerial and reel remain, and these are entirely standard. The current was obtained from a dynamo attached to the undercarriage strut, which is still *in situ*, though its propeller is missing. This dynamo is shown in Fig. 36.

The fitting shown in Fig. 37 was found on the starboard side of the C.V. machine; and is obviously a release for some light object. Its precise function is unknown. Fig. 38 shows the C.VI. gun ring, and it will be noticed that the padded clip is not in its usual vertical position.

Fabric and Dope

The usual printed fabric with a design of coloured polygons is used, and nothing regarding fabric or painting calls for comment.

Schedule of Principal Weights (C.VI. Type)

	lbs.	ozs.
Fuselage, without undercarriage, engine, or centre section	440	0
Lower wing, covered complete (no *ailerons*)	76	12
Upper wing, covered complete (with *ailerons*)	85	4
Centre section without struts or cable	64	0
Centre section N strut	5	8
Interplane strut, each	3	11
Aileron, covered, each	8	4
Balanced elevator, covered, complete in one piece	14	8
Undercarriage, comprising :—		
2 Vees, bare	29	1
2 wheels, with tyres	55	8
2 axle caps, with pins	0	6
2 shock absorber bobbins	1	4
2 shock absorbers	17	6
Axle and fairing	23	2½
Compression tube in front of axle	3	0
2 bracings wires, with strainers	2	0
4 ferrules	0	10
Undercarriage, complete	132	5½
Tail skid, bare	4	6
Brass oil tank, with 20 ins. copper pipe	9	7
Ammunition magazine (aluminium)	5	0
Exhaust pipe	16	4
Spinner	2	9
Dynamo, without propeller	23	12

Both of these aeroplanes are at present at the Enemy Aircraft View Room, Islington. Passes may be obtained on application to :—The Controller, Technical Department, Ap.D. (L.), Central House, Kingsway, W.C. 2.

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What a Daily Contemporary calls a "Scoop"

WITH reference to the ridiculous *canard*—otherwise called a "scoop—published by a daily newspaper on December 18th, the Air Ministry issued the following statement on the following day :—

"The statement that the Air Ministry is to come to an end is totally inaccurate. No such proposal is under consideration."

Sir Douglas Haig's Home-Coming

IT was fitting that the R.A.F. should play a prominent part in the home-coming of Field-Marshal Sir Douglas Haig on December 19th.

Major-General J. M. Salmond, C.M.G., D.S.O., commanding the R.A.F. in France was included in the party of commanding officers, etc., accompanying Sir Douglas Haig, and all the way from France to Buckingham Palace, aircraft acted as escorts, formations of aeroplanes and seaplanes convoying the Belgian mail steamer across the Channel and another squadron flying above the train from Dover to London.

Cairo to Calcutta

THE Air Ministry, on December 18th announced the landing at Calcutta of Major-General W. G. H. Salmond, the commander of the Royal Air Force in the Middle East, whose flight from Cairo to Delhi in a Handley-Page machine was announced in our last issue.

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The total distance of the route from Cairo to Calcutta, *via* Damascus, Baghdad, Bushire, Bandar-Abbas, Charbah, and Karachi, is about 3,950 miles, the last stage, from Delhi to Calcutta, measuring about 750 miles.

The Ipswich to India Flight

OWING to bad weather the Handley-Page machine H.M.A. "Carthusian," piloted by Major A. S. MacLaren, M.C., and Captain Halley, in which General MacEwan started from Ipswich on December 13th to fly to India, has been delayed, but it was announced on December 18th that the aeroplane had safely reached Pisa. On the following day the machine arrived at Rome.

What Berlin Missed

IT has now been disclosed that when the armistice was signed a British squadron was ready at a certain point on the East Coast awaiting orders to leave with the object of bombing Berlin. Each machine was loaded with two tons of bombs, and crews of men selected from many keenly competitive volunteers were standing by in readiness.

It was to be a purely British attempt from British soil to show what British machines could do.

THE ROLL OF HONOUR

(When an Officer is seconded from the Army, his unit is shown in brackets)

Published December 16th

Killed

Craddock, Sec. Lieut. H. C.
McConnell, Sec. Lieut. D. E.
Richardson, Sec. Lieut. T.
Warren, Sec. Lieut. E. D.

Previously Missing, now reported Killed

Walford, Capt. W. G.

Repatriated

Atkins, Capt. B. S.
Bartlett, Lieut. A. F.
Floyer, Capt. E. A.
Hackman, Capt. T. R.
Heriot, Capt. C. A. M.
Herring, Lieut. G. E.
Senior, Sec. Lieut. H. H.
Ward, Lieut. A.
Wells, Capt. T. R.
Welman, Lieut. J. B.
Wingfield-Smith, Capt. S. C.

Published December 18th

Killed

Whitham Lieut., J. H.

Previously Missing, now reported Killed

Russell, Sec. Lieut. R. F.
Sumsion, Lieut. F.

Repatriated

Adams, Sec. Lieut. N. F.
Allan, Sec. Lieut. C. M.
Ambler, Lieut. J. J.
Beesley, Sec. Lieut. R.
Bowater, Capt. A. V.
Bowles, Lieut. F. S.
Bruce, Sec. Lieut. A. P. C.
Caswell, Lieut. G. F. C.
Cole, Lieut. H. A.
Coleman, Sec. Lieut. J. P.
Coles, Sec. Lieut. G. T.
Collins, Sec. Lieut. J. C.
Conlan, Sec. Lieut. T.
Conover, Lieut. C. C.
Evans, Sec. Lieut. A. W. R.
Eyres, Lieut. L. H.
Fairhurst, Sec. Lieut. A.
Farquharson, Lieut. R. J.
Fellows, Lieut. H. V.
Fleming, Sec. Lieut. P. J. A.
Forman, Capt. J. H.
Formilli, Lieut. G. C.
Francis, Sec. Lieut. C. E.
Gadd, Sec. Lieut. W. G.
Gladstone, Lieut. C. A.
Goodfellow, Sec. Lieut. S. J.
Goodson, Lieut. A. R. L.
Gower, Lieut. J. L.
Henry, Lieut. R. A.
Holbrook, Lieut. C. M.
Hunt, Sec. Lieut. K. P.
Hunter, Lieut. H. C.
Hyde, Lieut. H. E.
Ingram, Capt. R. S. S.
Jackson, Sec. Lieut. W. R.
Keble, Sec. Lieut. F. J.
Lewis, Lieut. W. T. S.
Living, Lieut. C. H.
Luard, Sec. Lieut. R. B.

Published December 19th

Died

Corbett, Lieut.-Col. C. D. H.
Dyson, Lieut. H. R.
Leeming, Sec. Lieut. L.
Spencer, Lieut. H.
Walton, Capt. J. W.

Repatriated

Adams, Lieut. F. P.
Bird, Lieut. B. A.
Crosbie, Capt. D. S. K.
Crossley-Meates, Lieut. B.
Gaye, Capt. A. D.
Holman, Sec. Lieut. H. G.
McKay, Capt. E. A., M.C., D.F.C.
Matthews, Sec. Lieut. J. A.
May, Lieut. L. B.
Moore, Lieut. C. R.
Mucklow, Lieut. S. L.
Naylor, Lieut. C. B.
O'Connor, Lieut. O.
Palmer, Lieut. C. V.
Payne, Sec. Lieut. J. M.
Payne, Sec. Lieut. P.
Peeling, Sec. Lieut. H. V.
Pope, Lieut. R. A. B., M.C.
Riffkin, Sec. Lieut. R.
Robinson, Lieut. B. W.
Robinson, Sec. Lieut. F. B.
Rofe, Sec. Lieut. H. H.
Rolfe, Lieut. B. R.
Simson, Sec. Lieut. J. A.
Sinclair, Sec. Lieut. D. B.
Smith, Lieut. G. H. B.
Smith, Lieut. L. H.
Sorley, Sec. Lieut. J. T.
Stockman, Lieut. E. J.
Stockwell, Sec. Lieut. L. G.
Stone, Lieut. R. H.
Strathearn, Lieut. W. M.
Taylor, Sec. Lieut. J. C.
Thomson, Lieut. R. W. L.
Walker, Lieut. E. G. S.
Wells, Capt. G. A.
Windover, Capt. W. E.
Wise, Lieut. S. J.
Wood, Lieut. A. W.

Published December 20th

Died

Benfield, Lieut. A. W.
Clarke, Capt. W. R. B.
Hainsworth, Lieut. G.
Pearce, Maj. S. M.
Poole, Lieut. L. S. R.

Repatriated

Crookell, Sec. Lieut. S. E.
Dunlop, Sec. Lieut. J. M.
Hall, Sec. Lieut. W. A.
Herriot, Lieut. W. M.
Macfarlane, Sec. Lieut. W. K.
McCullock, Sec. Lieut. I. M.
Powles, Lieut. G. P.
Rochford, Lieut. S. W.
Schorn, Sec. Lieut. F. F.
Slade, Sec. Lieut. R. J.
Wyncoll, Sec. Lieut. A. W.
Yeomans, Lieut. J. H. M.

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Back from Germany

THE following officers, who were prisoners in Germany, have been released :—

Lieut. L. R. Briggs, London R., attd. R.F.C.
Lieut. D. C. G. Murray, R.E., attd. R.F.C.
Lieut. E. G. Green, M.C., R.E., attd. R.F.C.
Lieut. W. H. Green, King's (L'pool) R., attd. R.F.C.
Lieut. G. N. Robertson, High. L.I., attd. R.F.C.

The following officers, who were prisoners of war in Germany, have been released, and have arrived in England :—

Lieut. F. C. Andrews, R.F.C.
Lieut. G. C. Atkins, R.F.C.
Lieut. C. D. Bennett, R.F.C.
Capt. E. W. Cornish, M.C., Aus. F.C.
Lieut. D. B. Gayford, Queen's (R.W. Surrey R.), attd. R.F.C.
Lieut. F. R. C. Cobbold. R.F.C.
Lieut. S. A. Hustwitt, Can. Eng., attd. R.A.F.
Lieut. C. M. McCann, Can. M.G.C., attd. R.A.F.
Lieut. G. A. Mercer, Can. Cyc. Corps, attd. R.A.F.
Lieut. F. D. Slee, R.F.C.
Lieut. K. E. Tullock, R.F.C.
Capt. E. G. S. Walker, R.F.C.
Lieut. A. W. Wood, W. Yorks. R., attd. R.F.C.

From Austria

THE following officer, who was a prisoner of war in Austria, has been released :—

Lieut. A. Jerrard, V.C., S. Staff. R., attd. R.F.C.

From Turkey

THE following officers, who were prisoners of war in Turkey, have been released :—

Lieut. W. H. Treloar, Aus. F.C.
Capt. T. W. White, Aus. F.C.
Lieut. E. N. Baillon, Brit. Col. R., attd. R.A.F.
Capt. W. L. Haight, W. Ont. R., attd. R.A.F.
Lieut. L. W. Heathcote, Aus. F.C.

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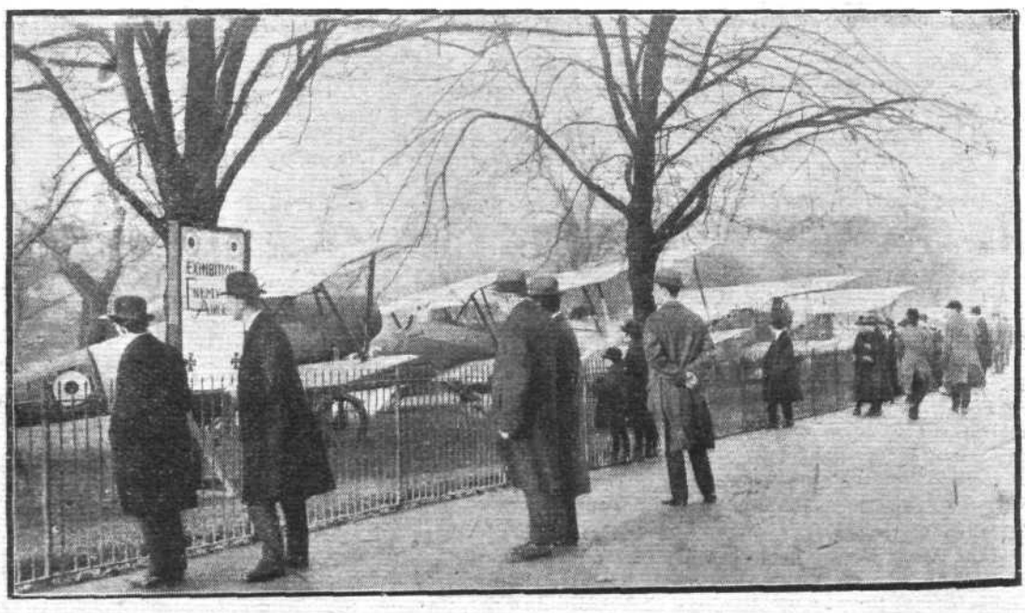

Enemy aircraft on exhibition in St. James's Park.

FLIGHT

AN APPARENT REVOLUTION IN FABRIC LOOMS

By QUÆSTOR

WITH perdurable peace at last within grasp and hold, quality must be, since sheer quantity need no longer be, the dominant factor of our aero-production. And with economy ever before us, again must rule the commercial consideration of durability. As ever, we must leave no least detail of aero-material open to doubt; all must be of the soundest; but the wholesale scrapping of what merely suffers from a curable defect, in view of the supreme emergency of the occasions of war, and indenting upon "Stores" for new at any cost, will have to pass with the War.

We shall then be on the surest ground, I submit, if in our reforms of structure and material, we make the prime attack on the worst and most unsatisfactory features. Study them, find the remedy as we may, and apply it in each case, and then the minor defects will be found to harmonise, so to say, automatically into the general scheme of improvement. If not—well, in that case our proposition is different from any other materially constructive one yet experienced.

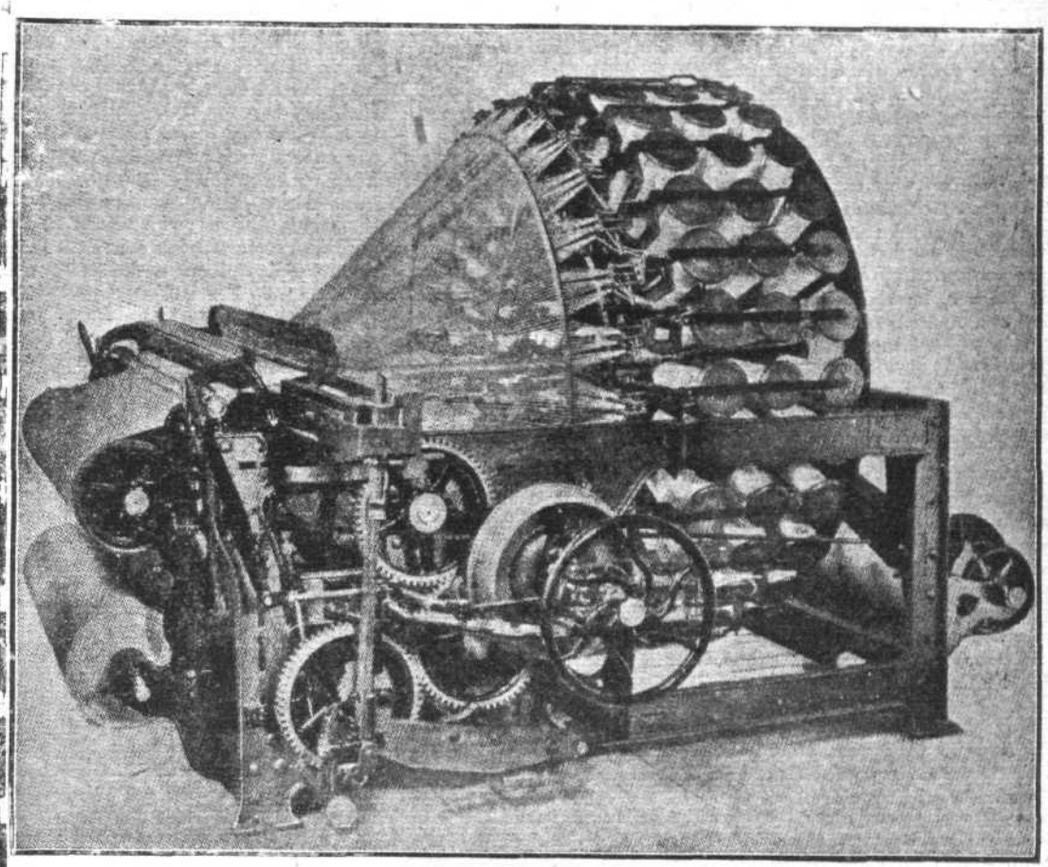

Fig. 1.—The new Trautvetter loom for auto-tyre and aero fabric claimed to weave diagonal threads in two directions as well as the ordinary warp and weft, in order to give equal strength in all directions without necessitating extra weight per square foot.

On Defects: And The Choice of Material

Now what is this worst feature in aero-construction? Apparently the plane "fabric." For however much we may import metal into the body-work and skeleton, it must be years before we can surface with metal, even if we had an entirely suitable alloy ready to hand. For on this point, though much has been claimed that may be true, nothing is established except the failures of past attempts; that have been no better than the interesting curiosities of pre-War aero-shows. No less in automobilism does the fabric of tyres, rather than the rubber, appear as the weak spot; so far merely "improved" by all sorts of skilful compromises rather than brought to the standard of strength of the rest.

What have we then to choose from as to fibre? Flax, cotton, ramie, sisal and nānduty. This last, though of wonderful promise, and growing as a weed over vast tracts of Argentina and Paraguay, has not yet been brought into commercial production. Sisal has always been most hopefully spoken of: but one notices that its supply appears to be somewhat spasmodic. Again, practically there is no fibre grown—or that can be so cheaply grown—of such marvellous quality as ramie. But the provisos are first, that the pectines, or subtly adherent interstitial gums, shall be got rid of without the hitherto inseparable use of alternate acid and alkaline baths and rettings, wholly destructive of the strength of the fibre; and secondly, that it shall be realised—as investors in ramie adventures and spinners do not, one finds—that ramie fibre, unlike that of cotton, has no adherent "snake-mouth" at the ends; nor, despite its wonderful staple length, has it the adhesive curl of wool. Here we are approached merely to the weaving problem. So the proposition, so far, practically narrows down to flax and cotton, with the latter very much in the commercial ascendant; and from its greater cheapness and bulk of production, in much the greater prospective demand for aero fabric—provided

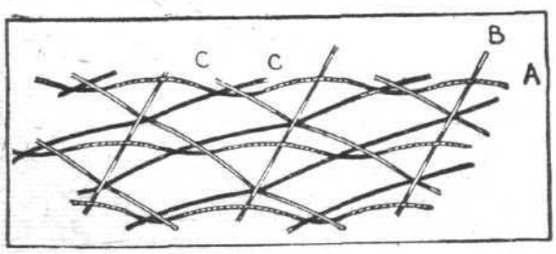

Fig. 2.—Enlarged view of the fabric showing how the diagonal or bias threads run through the warp and weft.

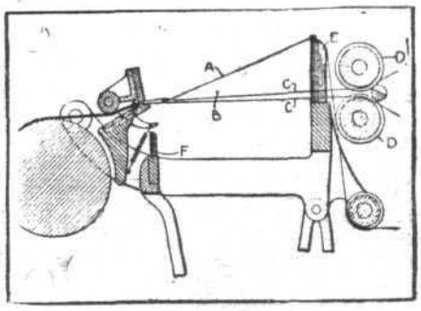

Fig. 3.—The warp, A, raised above the bias threads, CC.

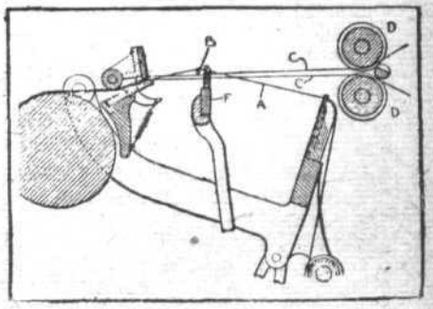

Fig. 4.—The warp, A, lowered while the weft or lay, B, runs across over the bias threads, CC.

always that the weaving of it can be brought into line with the peculiar qualities of flax.

Certain Mechanical Limitations

So far, the necessities of the case in aviation—chiefly due to the mechanical limitations of the fabric as woven—have demanded the drawing on of the coverings endwise over the wing frames in a loose fit, depending on the subsequent taping up for the most part and then on the doping, for the adequate drum-like tightening. This condition has consequently endured merely in terms of hours of active flight, after which—and no great amount of service, in some weather conditions—hopeless "sogginess" has set in. And—to trace the matter back to its real root—while the weaving of the fabric remained as it did, nothing could be done. One merely imagined that with a different system—as for instance the incorporation of diagonal reinforcing threads, both ways athwart the matt or even the twist of the weave, so as to allow free movement in all directions, but precluding stretch in any one of them—much might be done. Indeed, that then it should be possible to revise all the more obstructive mechanical conditions.

So too, with tyre fabric, which serving as a foundation for the rubber, must not only be able to withstand enormous tensions in all directions as well as shock-stresses, but must at the same time retain its flexibility unimpaired. Which latter idea is at once contradicted by the use of merely heavier threads! And for aviation fabric, any extra weight per square foot is in itself objectionable, whatever the mechanical sake or gain.

The New Diagonal-Weave Loom

Thus it occurred to Mr. W. G. Trautvetter of Patterson, New Jersey, that the solution of the problem lay in designing a fabric which, while no heavier as to actual fibre-content, should have just such diagonal threads incorporated with its regular warp and filling. This idea—or ideal—once defined, it became necessary to create practically a new model loom to weave it; for as any one with the least acquaintance with such machines will realise, how revolutionary must the mechanism be that would put bias threads into a weave simultaneously with the run of the warp and filling.

Hence the machine illustrated in Fig. 1; which, assuming, as one may fairly do, that it realises all that is claimed for it in this way, seems destined to revolutionise the weaving of both aero and tyre fabric: and therefore should be of the first interest to readers. Complicated as it looks, it will be seen first that the mass of it merely consists of a drum frame, with a series of spools or winders staged in threes upon it; these feeding the actual loom in much the usual way. The further diagrams, Figs. 2, 3 and 4—all of which I take from the *Scientific American*—then become easier to follow.

And The Weaving Process

As for instance, in Fig. 2, we see an enlarged perspective of the fabric showing how the threads run. A is the warp. B the filling and C indicates the bias threads; and it will be specially noticed that the weft or filling threads always pass *under* the warps and *over* the bias threads. Referring then to Fig. 1, we see that these last are those which are carried in the spools on the big winding drum or reel. Figs. 3 and 4 now show that they run to a pair of threaded screw rollers, D. The warps pass through the needle frame E, which constantly raises them through and above the bias threads, the shuttles passing with the weft between both threads during this period. Now, owing to the revolving motion of the reel—the plane of which is naturally athwart that of the loom—it becomes evident that the upper half of the reel will move the bias threads diagonally athwart the fabric in one direction while the lower half will move them in counterwise in the other. Also it will be seen that the rollers D serve to keep them properly spaced. Or to make the operation perhaps clearer, the fingers of the needle frame pass between the diagonals and lift the warps as shown in Fig. 3. Then the shuttle-throw carries the weft B across the fabric; next the needle frame drops and the lay F beats the weft into place, as shown in Fig. 4. Just as the needle bar comes below the diagonals, the latter are carried by their rollers in the destined opposed diagonal directions; and then as soon as the bar rises its fingers pass between another set of diagonals. Thus the diagonals are interlaced relatively to the warps, but the wefts are intermeshed between both the warps and the diagonals.

The Apparent Textile Result

The result at any rate of this mechanical thread-leading should be as claimed, a fabric equally strong in all directions; and thus able to sustain—as has not been the case hitherto—diagonal strains as well as those running with or across the fabric squarely. Such a result may well revolutionise the whole aspect and technique of pneumatic tyre construction; and at any rate, the obviously added strength without further weight can be hardly less desirable for aero-fabrics. One, it would be imagined, that might render possible a different application to wing frames; more direct and to a more accurate fit, prior to doping, and independent of it for the ultimate result of drum-like tightness. And if that be so, the final result—at least one may hazard this speculatively—might well be the elimination of sogginess, as the dope itself would then need to have no other function than its primary one of glazing the surface.

At any rate, from the foregoing considerations, now that the end of the War promises greater liberty of machinery importation, this matter of the new Trautvetter loom seems well worth the attention of aero-industrialists and spinners of tyre canvas.

French Government and Commercial Aeronautics

AN interministerial commission has recently been established in France to deal with matters arising out of the future developments of aircraft. It will be the endeavour of the commission to establish rulings which will not hamper the development of aviation, and they will be charged with sketching out legislation which will exercise a tempered control. Such matters as direction signs, the lighting of aerodromes at night, recognised signals of distress, &c., will come within their purview. The Commission is being organised by M. Rodolphe Soreau, President of the Commission of Aviation of the Aero Club of France, and M. Paul Rousseau.

M. Soreau gives it as his opinion that Governmental aid will be forthcoming in connection with the development of French commercial aviation, and more particularly as regards the exploitation of the North African Colonies.

Commercial Aviation in U.S.A.

CAPT. BENJAMIN B. LIPSNER, who a few days ago resigned his position as Superintendent of the United States Aerial Mail Service, announced in New York on December 17th, that a syndicate had been formed with £200,000 capital for establishing an aerial passenger and express service between New York and Chicago The service between Chicago and New York will, he hopes, start in May with a number of aeroplanes capable of carrying 40 passengers or their equivalent in weight.

Another Transatlantic Competitor

CAPT. LIPSNER also stated that, unless someone should anticipate him, he would attempt the Transatlantic flight on June 15, on a seaplane which is now being constructed. He proposes to follow the route taken by the "George Washington" on its voyage to France with Mr. Wilson on board.

Wireless and Commercial Aeroplanes

IT is stated that arrangements are being made by the Marconi Company to instal on all aeroplanes engaged on commercial service, a combined wireless and telegraph set and an efficient operator, the scheme being very much on the same lines as that which now applies to ships. General weather reports will be issued from wireless stations at home and abroad The large number of ships at sea on which there are Marconi installations will help in the complete organisation. As every aeroplane will doubtless have either a name or a distinguishing number it will be possible to send telegrams from any part of the world, or from any ship on the sea, to the aeroplane. It is intended that this organisation will be ready by the time peace is signed, and the relaxation of restrictions will allow the free flight of aeroplanes.

Where the Big Machine can Help

AN important part is to be played by aeroplanes in the erection of wireless stations in the extreme parts of China, one on the frontiers of Cashmere and the other on the Chinese side of Siberia. The necessary machinery will have to be conveyed right across China, and as there is neither railway nor road other means of transport have been sought for. The Marconi Company has arranged with Mr. Handley Page for the transport by one or more of his big machines. The journey inland will take two or three days in place of the same number of months, besides the safe crossing of a dangerous bit of country which would otherwise have made the scheme impracticable.

FLIGHT

THE REPORT OF THE CIVIL AERIAL TRANSPORT COMMITTEE

APPENDIX A.

INTERNATIONAL CONVENTION IN REGARD TO AERIAL NAVIGATION DRAFTED BY THE CONFERENCE HELD AT PARIS IN 1910.

With Observations of the Sub-Committee of the Committee of Imperial Defence, and of Special Committees Nos. 1 and 2 of the Civil Aerial Transport Committee.

Presented as Appendix A to the Report of Special Committee No. 1 of the Civil Aerial Transport Committee.

A = Acceptable.
* Observations of the Sub-Committee of the Committee of Imperial Defence.
† Observations and recommendations of Special Committee No. 1 of the Civil Aerial Transport Committee.
‡ Observations and recommendations of Special Committee No. 2 of the Civil Aerial Transport Committee.

CHAPTER I.—*Nationality and Registration of Aircraft.*

ARTICLE 1.—The term "aircraft" comprises: Free balloons, airships and flying machines. [* A. † A.]

ARTICLE 2.—An aircraft is only governed by the present Convention if it possesses the nationality of a contracting State. None of the contracting States shall permit a free balloon or airship to fly over its territory unless it complies with the above condition, though special and temporary authorisation may be granted. [* A. † To substitute the words "an aircraft" for the words "a free balloon or airship."]

ARTICLE 3. In determining the nationality of aircraft, the legislation of each contracting State shall base its decision either on the nationality of their owner or on his domicile in its territory; the State has, moreover, the right of requiring that the owner, if a national, shall also be domiciled in its territory, and it can place on its national register aircraft owned by foreigners domiciled in its territory as well as those owned by its own nationals. If the aircraft belongs to a corporate society or joint-stock company it can only acquire the nationality of the State where the company's head office is situated. In cases where the aircraft belongs to several owners the proportion of co-proprietors who are nationals of the State or are domiciled in its territory must be at least two-thirds. [* This Article to stand, provided that domicile is translated as "residence," and that the rights and duties which a State confers upon its aircraft are clearly defined and are similar to those drawn up at the 1910 Conference. † C.I.D. Sub-Committee's proviso approved. The Special Committee understand that the two criteria of the nationality of aircraft, viz., the nationality of the owner, and the owner's residence in the territory of a contracting State, are not mutually exclusive alternatives. Any provision as to nationality should be considered in the light of existing and future legislation relating to naturalisation of foreigners. Any future legislation as to the nationality of aircraft should provide that British nationality should be taken to mean ownership by British subjects or by corporate bodies registered in the United Kingdom or in some part of His Majesty's Dominions, the effective control of which for all purposes is vested in British subjects.]

ARTICLE 4.—When the aircraft possesses the nationality of one of the contracting States in conformity with article 3, none of the other States can confer their nationality upon it. [* A. † A.]

ARTICLE 5.—An aircraft will lose its nationality if the conditions under which it was granted cease to exist. [* A. † A.]

ARTICLE 6.—The State which confers its nationality on an aircraft shall enter the latter on a register. In cases where the aircraft's usual station is in the territory of another contracting State, the latter will immediately be notified of its registration. [* A. † A.]

ARTICLE 7.—The entry in the register shall contain a description of the aircraft and shall indicate the number or other identification mark given to it by the maker, the national mark provided for in Annex A, the registration number, the usual station, the name, nationality, and domicile of the owner, and the date of registration. [* A. † A.]

ARTICLE 8.—As soon as an aircraft has been registered a certificate of nationality shall be issued, consisting of an extract from the register giving the particulars specified in the preceding Article. [* A. † A.]

CHAPTER II.—*Certificates of Navigability and Licences.*

ARTICLE 9.—The contracting States will exchange annually in January the entries which have been made in their registers during the preceding year. On the request of another contracting State each State will be obliged to communicate as quickly as possible the names of the owner and pilot of any aircraft possessing its nationality which has entered the air-space over the other State. [* A. † A.]

ARTICLE 10.—When flying over the territory of one of the contracting States, aircraft must bear the mark of their nationality and their registration number, in the manner specified in Annex A. They shall also carry, affixed to the car or *fuselage*, a plate showing the name and domicile of the owner, and reproducing the nationality mark and registration number which they bear. [* A. † An additional classification should be provided distinguishing official, commercial, and private aircraft by means of special colouring or marks.]

ARTICLE 11.—The aircraft must be provided with a certificate of navigability issued or authenticated by the State whose nationality it possesses. [* A. † The Special Committee recommend that due provision should be made to secure the competency of pilots and to secure that aircraft plying for hire shall be of types officially certified as being navigable, but that certificates of navigability should not be required for individual aircraft and that this Article should be amended accordingly.]

ARTICLE 12.—The certificate of navigability will only be issued after what are considered to be sufficient trials made before a public authority of the contracting State, or an aeronautical association duly empowered by the State. Nevertheless, these preliminary trials need not be required in the case of free balloons, or of flying machines of a type whose navigability has already been duly established. Periodical or non-periodical visits must be made by the public authorities or by associations duly empowered, in order to verify the navigability of aircraft. Such visits shall be noted on the certificate. [* A. † A.]

ARTICLE 13.—The certificate of navigability shall contain the following particulars: Name or style of firm and domicile of the maker; place and year of manufactur; number or other identification mark given to the aircraft by the makers; photograph in the case of dirigible balloons and flying machines; characteristics of the aircraft in accordance with the provisions of Annex B. If one of the characteristics specified in the certificate of navigability is modified such certificate shall cease to be valid. [* A. † A.]

ARTICLE 14.—The pilot, chief mechanic, and their substitutes must be provided with licences issued or authenticated by the State whose nationality has been conferred upon the aircraft of which they are in charge. In urgent cases the pilot can choose, to replace him or to carry out the duties of chief mechanic, persons provided with licences issued or made valid by another contracting State. [* A. † A.]

ARTICLE 15.—Different licences will be issued for the control of a free balloon, an airship, and a flying machine, and the licence issued for one category of aircraft will not empower the holder to take charge of a different category. These licences will only be issued after the capacity of the pilots or mechanics has been proved by theoretical and practical tests carried out before a public authority of a contracting State, or an aeronautical association duly empowered by the State. [* A. † For the words "and a flying machine" to substitute the words "an aeroplane and a seaplane."]

ARTICLE 16.—Licences will only be granted to persons at least 18 years old and of good character. They shall contain the name, Christian names, and description of the holder, as well as his photograph and signature. [* A. † A.]

ARTICLE 17.—A contracting State can only give effect to a certificate or licence which has been issued by another contracting State. [* A. † A.]

ARTICLE 18.—Certificates of navigability and licences issued or authenticated by the State whose nationality an aircraft possesses shall be recognised as valid by the other States, unless it is clear that the conditions under which they have been issued in accordance with the regulations set forth above are no longer fulfilled. Each State has the right not to recognise, so far as flights within the limits of, and above, its own territory are concerned, the certificate of navigability or licence granted to one of its nationals by another contracting State. Such non-recognition shall immediately be notified to the State which has issued the certificate or licence. [* A. † A.]

CHAPTER III.—*Admission of Aerial Navigation within the limits of, or above the Territories of a Foreign State.*

Articles 19 and 20 were left undecided by the Paris Conference. In 1913 the Sub-Committee of the Committee of Imperial Defence suggested the insertion of the following Articles in the Convention:—

1. Each contracting State shall permit for so long as the present Convention is in force the aircraft of the other States to fly within the limits of and above its territory, subject to the restrictions laid down in the following rules:—

2. Each State shall have the right to impose restrictions on the navigation of foreign aircraft, and, more particularly, to forbid such navigation so far as it deems necessary in order to guarantee its own security or that of the lives and property of its inhabitants. These restrictions shall be applied without any inequality to the aircraft of every other contracting State. It is, however, agreed that on personal grounds, independent of its nationality a State can exempt an aircraft of any other contracting State from any one of the restrictions imposed in virtue of the first paragraph. [† The proposed rule suggested by the C.I.D. Sub-Committee approved. The rule proposed by the C.I.D. Sub-Committee limits a contracting State's right of restricting navigation by the aircraft of other contracting States, and prohibits it from differentiating as between different foreign contracting States. This proposal is open to the objection that one contracting State might use its powers of restriction more severely than others, but nevertheless could not on this account be differentiated against by the others. To meet this objection the Special Committee would propose to insert the following after the second sub-paragraph:—

"It is, however, agreed that any contracting State may refuse to accord to any other contracting State any facilities which the latter does not itself accord under its regulations."

"It is also agreed that on personal grounds," &c., &c.]

3. Moreover, each State can forbid or regulate the crossing of its frontiers, provided that the principle laid down in rule 1 is not violated, and that in every case, except when aerial navigation is forbidden, the extent and locality of the places where the passage of the frontier is permitted are such as to give access to the neighbouring contracting States. [* The Sub-Committe would prefer to omit Rule 3 altogether on the ground that it is superfluous. It was only drafted in case its omission should prove impracticable in the face of the opposition of other States. † The C.I.D. Sub-Committee's recommendation agreed to, the Special Committee being strongly in favour of the omission of any such rule.]

4. In cases of accident verified by an authority of the country where an aircraft has been compelled to land, the right of access, which under the provisions of Rule 2, paragraph 1, might be forbidden, cannot be refused. The provisions of Rule 2, paragraph 2, do not apply to the measures which, in extraordinary circumstances, a State may take to safeguard its security. [† The proposed rules suggested by the C.I.D. Sub-Committee approved.]

5. The contracting States undertake to adopt or to propose to their legislatures such measures as may be required in order to make the private law of their country conform to the above provisions.

* * * * * *

ARTICLE 21.—Each contracting State shall have the right to reserve the public conveyance of persons and goods between two points on its territory for nation aircraft only or for the aircraft of certain contracting States, or to subject such navigation to special restrictions. The establishment of international routes of aerial communication will depend upon the assent of the States concerned. [* A. † A.]

ARTICLE 22.—If a contracting State imposes restrictions such as those contemplated in Article 18, paragraph 2, its aircraft may be subjected to analogous measures by any other contracting State. [* A. † A.]

ARTICLE 23.—The restrictions and reservations contemplated in Article 19, 20, 21 and 22 shall immediately be published and notified to the Governments concerned. The forbidden zones shall be defined with sufficient precision to enable them to be shown on aeronautical maps of a scale of at least $\frac{1}{1000000}$. The contracting States shall be obliged to communicate these maps to one another. [* A. † First paragraph acceptable. To substitute for the second paragraph: "The forbidden zones shall be defined with precision and shown on aeronautical maps which the contracting States shall be obliged to communicate to one another."]

ARTICLE 24.—As soon as the pilot of any aircraft perceives that he has entered the air space above a forbidden zone he must give the signal of distress specified in Article 16 of Annex (C) and land as soon as possible; he must also land if requested to do so by warning given from the ground. Each State shall give notice of the warning signals which it has adopted. [* A. † To substitute for this Article the following:—"As soon as the pilot of any aircraft perceives that he has entered the air space above a forbidden zone he must act in accordance with such regulations as may be prescribed by the State. The contracting States shall communicate such regulations to one another."]

CHAPTER IV.—*Regulations to be observed on departure, on landing, and during flight.*

ARTICLE 25.—When flying, aircraft must be provided with their certificates of nationality and of navigability and with the licences of such of the personnel as require them. Log books must also be carried. [* A. † A.]

ARTICLE 26.—The log book must contain the following particulars: Category to which the aircraft belongs, its nationality mark, place and number of its registration, name, nationality, profession, and domicile of its owner.

For each ascent the following entries must be made in the log book :—

The name, nationality, and domicile of the pilot or crew, and the name, nationality, and domicile of the passengers ;

Whenever circumstances permit a description of the route followed and of the altitude kept ; the route will be indicated on a map, and the altitude, in the case of free balloons and airships, by means of a barograph which they must have on board.

Description of all interesting occurrences, and especially of the places called at, of the aircraft met during the flight, and of any accidents to the aircraft, crew or passengers.

These particulars will be entered in the log book, so far as possible, during the flight, or, if that is impossible, not more than 12 hours after landing. [* A. † To omit in the fourth paragraph the words : "and the altitude, in the case of free balloons and airships by means of a barograph which they must have on board."]

ARTICLE 27.—Each State remains free to regulate the conditions in which the log book of flying machines is kept so long as they fly exclusively over its territory. [* A. † A.]

ARTICLE 28.—The log book must be kept for at least two years after the last entry, and must be produced on every request of the public authorities. [* A. † A.]

ARTICLE 29.—The authorities of the country will always have the right to visit the aircraft on its departure and landing, and to exercise in the atmosphere above their territory police jurisdiction and customs supervision. Each State can enact that if an aircraft of another contracting State lands on its territory the nearest police or Customs authorities must immediately be notified. The personnel on board the aircraft must conform strictly to the police regulations and provisions of the Customs laws of the country. [* A. † Acceptable, but the Special Committee hold the view that in the case of the United Kingdom there is no necessity to press for a right of Customs supervision *in* the air.]

ARTICLE 30.—Each State undertakes to enact that all aircraft within the limits of, or above, its territory, and all its own aircraft within the limits of, or above, the territory of another contracting State shall comply with the "Rules relating to Aerial Traffic" annexed to the present Convention (Annex (C)) and to punish those which fail to do so. [* A. † A.]

ARTICLE 31.—The contracting States must instruct their authorities to afford aircraft the necessary assistance when they land or are in distress. They will also instruct their populations, as well as their shipping and aircraft, in the measures to be taken to assist an aircraft in distress. [* A. † A.]

ARTICLE 32.—Any person finding a wrecked aircraft must notify the neighbouring municipal authority or the competent authority at the next port at which he touches ; the wreck, if it can be identified, will be restored to its owner, who, if he does not abandon it, shall repay the expenses of the person who has salved it, and shall remunerate him at the rate of 5 per cent. of the value of the wreck. If the wreck is abandoned, the competent authority will proceed according to local legislation. [* A. † Acceptable, it being understood that the Article contemplates the finding of wrecked aircraft both on land and at sea, and that in the first case the notification must be made to the neighbouring municipal authority, in the second to the competent authority at the next port touched at.]

CHAPTER V.—*Customs and Transportation.*

ARTICLE 33.—Aircraft landing in a foreign country and intended to be re-exported shall enjoy, together with their equipment, exemption from customs dues, provided they comply with the formalities required in this respect in each country, such as those in regard to permits to import for drawback, temporary admission, payment of dues into Court, or the triptych. Supplies and material for the navigation of the aircraft will enjoy the privileges and exemptions usually accorded to the contracting State. When a landing takes place in a foreign country the baggage and personal effects of the aeronauts and passengers on board an aircraft shall be given the same treatment as similar objects which travellers or passengers import by the land or sea frontiers. [* A. † Acceptable, provided that the privileges and exemptions accorded in respect of supplies and material for the navigation of aircraft are of the same nature as those generally accorded in respect of supplies and material for the running of motor cars taken to a foreign country for touring purposes.]

ARTICLE 34.—The carriage of goods by air can only take place in virtue of special conventions between the States concerned or of the provisions of their own legislation. [* A. † Acceptable, provided that the word "goods" should be taken to mean goods in a commercial sense.]

ARTICLE 35.—The carriage by aircraft of explosives, arms, and munitions of war, and of traveller and other carrier pigeons, is forbidden in international traffic. [* A. † A.]

ARTICLE 36.—Each State can forbid or regulate the carriage or use of photographic apparatus above its territory. It can cause the negatives found on board a foreign aircraft landing on its territory to be developed, and can, if necessary, seize the apparatus and negatives. [* A. † A.]

ARTICLE 37.—Restrictions can be imposed on the carriage of articles other than those specified in Articles 34, 35, and 36, provided such restrictions are, generally speaking, applied to national aircraft in the same way as to foreign aircraft ; it is, however, agreed that, for personal reasons independent of nationality, a State can exempt an aircraft from one or other of these restrictions. [* Proposed to omit the words "applied to national aircraft in the same way as to foreign aircraft," and to replace them by the words "applied to the aircraft of all other contracting States." † Acceptable, subject to the amendment proposed by the C.I.D. Sub-Committee.]

ARTICLE 38.—Each State has the right to authorise aircraft within the limits of and above its territory to carry on board a radio-telegraphic apparatus. Such apparatus cannot, without special permission, be used except when the safety of the aircraft is concerned. [* Proposed to insert after the words "radio-telegraphic apparatus" the words "or to forbid them to do so." † To substitute for this Article the following : "Each State has the right to forbid or to regulate the carriage, or use, within the limits of and above its territory, of radio-telegraphic apparatus."]

ARTICLE 39.—The regulations issued in virtue of Articles 34, 36 and 37, and the general authorisations granted in virtue of Article 38, shall immediately be published and notified to the other contracting States. [* A. † Consequent upon the preceding recommendation, to omit the words "and the general authorisations granted in virtue of Article 38," and to substitute the words "and 38."]

CHAPTER VI.—*Public Aircraft.*

ARTICLE 40.—Public aircraft are the aircraft employed in the service of a contracting State, and placed under the orders of a duly commissioned official of that State. The provisions of the present convention will be applied to public aircraft, with the exception of those of Articles 2 to 5, 11 to 18, and 38. Public aircraft may carry a radio-telegraphic apparatus on board, but cannot use it, without special permission, except when the safety of the aircraft is concerned. [* A. † In the second paragraph, to omit the words "and 38." In the third paragraph, after the words "use it" to insert the words "when in or above foreign territory."]

ARTICLE 41.—Military aircraft are the public aircraft in military service when they are under the orders of a commander in uniform and have on board a certificate proving their military character. Besides the provisions from which public aircraft are exempted by Article 40, paragraph 2, the provisions of Articles 6 to 10, 35 and 37 do not apply to military aircraft. Military aircraft come under the special provisions of Articles 43 and 46. [* A. † A.]

ARTICLE 42.—The only distinctive national mark borne by military aircraft will be the Sovereign emblem of their State. Each contracting State shall notify the other States of the Sovereign emblem which it will use. [* A. † Acceptable subject to the proviso that His Majesty's Government should have the right to select any emblem or distinctive mark which appears suitable to them, not necessarily a national flag design.]

ARTICLE 43.—In cases where any communication has to be made by the commander of a military aircraft, he will notify the competent authorities of the country ; if the latter are not military authorities, they will inform the military authorities without delay. [* A. † A.]

ARTICLE 44.—The departure or landing of the military aircraft of a contracting State in the territory of another State will only be allowed with the latter's authorisation. Moreover, each contracting State is free to forbid, or to regulate, as its interests demand, the passage of the military aircraft of the other contracting States over its territory. [* New Article proposed. The departure or landing of the military aircraft of a contracting State in the territory of another State, as well as the passage of military aircraft over such territory, will only be allowed with the authorisation of the latter State. † The new Article proposed by the C.I.D. Sub-Committee approved.]

ARTICLE 45.—Nevertheless, a sojourn required by necessity cannot be refused to the military aircraft of a contracting State. A military aircraft which, in such case of necessity, is above a foreign territory, shall give the signal of distress laid down in Article 16 of Annex (C), and shall effect a landing as quickly as possible. Immediately after landing, the commander of the aircraft shall notify the competent authority of the country, as defined in Article 43. The military authorities will make an examination and decide upon the necessity of the landing. [* A. † A.]

ARTICLE 46.—When the sojourn of the military aircraft within the limits of, and above, the territory of a foreign State, is to be regarded as legitimate in conformity with Articles 44 and 45, such aircraft shall enjoy the privilege of extra-territoriality. Similarly the members of the crew wearing uniform shall enjoy extra-territoriality, so long as they do not cease to form a distinct unit or are carrying out their duties. The authorities of the country are not, however, precluded from applying to the military aircraft of another contracting State, and to their crews, the measures required either to assure the safety of the State, or the observance of sanitary regulations, or to protect lives and property from imminent danger. [* New Article proposed. When the stay of the military aircraft within the limits of and above, the territory of a foreign State is to be regarded as legitimate, in conformity with Article 44, such aircraft will enjoy the same privileges as are accorded by international usage and courtesy to foreign ships of war. The above privileges will also be accorded to the members of the crew wearing uniform, so long as they do not cease to form a distinct unit or are carrying out their duties. Note by the Sub-Committee.—*It is desirable to press at the same time for the insertion of a separate clause requiring public as well as private aircraft claiming the privileges of distress to submit to "constatation" (verification).* † The new Article proposed by the C.I.D. Sub-Committee and their note as to verification in the case of public aircraft approved.]

ARTICLE 47.—Police aircraft are public aircraft employed in the service of the police, especially that of the departments of public safety, public health, or customs. The provisions of Articles 41, 42, 44 and 45 will by analogy be applied to police aircraft. The sovereign emblem borne by police aircraft will be different to that of military aircraft. Moreover, the functions which under article 45, paragraph 3, belong to the military authorities, will, in the case of police aircraft, be carried out by the civil authorities. [* A. † Acceptable, subject to the Special Committee's proviso with regard to Article 42.]

CHAPTER VII.—*Final Provisions.*

ARTICLE 48.—The present Convention shall apply to aerial navigation within the limits of and above the territory or territorial waters of the contracting States. The provisions of the Convention, within the terms of Article 2, shall be imposed upon the aircraft belonging to the nationals of a contracting State, whatever their domicile, and upon the aircraft belonging to the nationals even of a non-contracting State domiciled in the territory of a contracting State. [* A. † A.]

ARTICLE 49.—The present Convention does not restrict the freedom of action of belligerents, or affect the rights and duties of neutrals. [* A. † A.]

ARTICLE 50.—A central authority shall be set up in each State to make and receive direct the communications contemplated in the Convention. [* A. † A.]

ARTICLE 51.—The present Convention shall be ratified as soon as possible. The ratifications shall be deposited in the archives of the Ministry for Foreign Affairs of the French Republic. The first deposit of ratifications will be recorded in a protocol signed by the representatives of the adhering States and the Minister for Foreign Affairs of the French Republic. The later deposits shall be made by written notification addressed to the French Government and accompanied by the ratification. Certified copies of the protocol of the first deposit of ratification, of the notifications mentioned in the preceding paragraph, and of the ratifications which accompany them, shall immediately be communicated by the French Government through the diplomatic channel to the States which have signed the present Convention, or adhered to it. In the cases contemplated in the preceding paragraph, the said Government shall at the same time make known the date on which it received the notification. [* A. † A.]

ARTICLE 52.—The present Convention does not apply as of right except to the mother countries of the contracting States. If a contracting State desires that it should be put into force in its colonies, possessions, or protectorates, it shall declare its intention either expressly in the ratification or in the Act of Adherence (Article 53, paragraph 2), or by a special notification addressed in writing to the French Government, which shall be deposited in the archives of that Government. If the State making the declaration chooses the latter procedure, the French Government will immediately transmit to the other contracting States a certified copy of the notification, indicating the date of receipt. [* Proposed : After words "into force in" insert the words "one or more of." At end of article insert : "The denunciation of the present convention by one of the contracting States for one or more of its colonies, possessions, or protectorates, will always be effected by a special notification addressed to the French Government, which will be deposited in the archives of that Government. It will take effect twelve months after the date of such deposit." † The amendments proposed by the C.I.D. Sub-Committee approved.]

ARTICLE 53.—Non-signatory States may adhere to the present convention, whether they were represented at the Paris Conference on Aerial Navigation or not. The State which desires to adhere notifies its intention in writing to the French Government, enclosing the Act of Adhesion which will be deposited in the archives of the said Government. This Act will show the letter or combination of letters which the State will use as its national mark, and which must differ from those included in Annex (A). The French Government shall immediately transmit to all the signatory or adhering States a certified copy of the notification and Act of Adhesion, indicating the date of receipt. [* A. † A.

ARTICLE 54.—The present Convention shall take effect, for the States which participate in the first deposit of ratifications, 60 days after the date of the protocol of the deposit, and for the States which ratify or adhere to

ét afterwards, and the colonies, possessions, or protectorates not mentioned in the ratifications, 60 days after the notifications specified in Article 51, paragraph 4, Article 52, paragraph 2, and Article 53, paragraph 2, have been received by the French Government. [* A. †A.]

ARTICLE 55.—If one of the contracting States wishes to denounce the present Convention, the denunciation shall be notified in writing to the French Government, who will immediately communicate a certified copy of the notification to all the other States, indicating the date of receipt. The denunciation, which cannot be made till three years after the date of the first deposit of ratifications, shall apply only to the State which has notified it, and one year after the notification has reached the French Government. [* Proposed: For words "three years" in the second paragraph read "two years." Insert at end of article: "After two years from the date of the first deposit of ratifications each State will have the right to summon a conference to revise the convention, and, in default of an agreement, the present Convention will terminate if its prolongation is not voted by a majority of the contracting States." † Acceptable, subject to the amendments proposed by the C.I.D. Sub-Committee.]

Done at Paris, and in one single copy.

ANNEX (A).

Nationality and Registration Marks.—The nationality mark specified in Article 10 will be represented by the following capital letters in Latin characters: Germany, D; Austria, A; Belgium, B; Bulgaria, B G; Denmark, D M; Spain, E; France, F; Great Britain, G B; Hungary, H; Italy, I; Monaco, M C; Netherlands, N L; Portugal, P; Roumania, R M; Russia, R; Serbia, S B; Sweden, S; Switzerland, S S; Turkey, T. The letters and numbers indicating the nationality mark and registration number must be legible at the greatest possible distance, and must in all cases have a minimum height of 65 cm. The letters and numbers will be two-thirds as wide and one-sixth as thick as their height. They will be coloured black on a white background, and painted on the aircraft itself in a place chosen so that the distinctive signs are legible in flight. [* A. † A.]

ANNEX (B).

Characteristics of the Aircraft. (Article 13 of the Convention.)

For free balloons: 1. Dimensions of the envelope (diameter, circumference, capacity). 2. Diameter of the valve. 3. Fabric of the envelope. 4. Position of the valve and rip-panel, with their respective controls. 5. Details of the suspension of the car.

For airships: 1. Envelope: type; nature, principal dimensions, ballonets. 2. Car: quantity, dimensions, position. 3. Motor: type, quantity, power, bore of cylinders, stroke of pistons. 4. Propellers: type, quantity, position. 5. Vertical rudders: type, quantity, position. 6. Horizontal rudders: arrangement, type, quantity, position. 7. Stabilising planes: arrangement, quantity, position.

For flying machines: 1. Type. 2. Planes: quantity, dimensions, total surface, position. 3. Motors: as for dirigibles. 4. Propellers: as for dirigibles. 5. Rudders: as for dirigibles. 6. Tail-planes: as for dirigibles. 7. Landing chassis: nature, position. [* A. † A.]

ANNEX (C).

Rules relating to Aerial Navigation. (Article 30 of the Convention.)

1. *Regulations respecting Lights.*

ARTICLE 1.—The regulations concerning lights must be observed from sunset to sunrise in all weathers, and during that time no other light must be shown which could be taken for one of the prescribed lights. [* A. † A.]

ARTICLE 2. *Lights to be carried by Airships.*—An airship under way, that is to say, moving under its own power, must carry:—

(*a*) At the bow, a brilliant light arranged in such a manner as to throw an uninterrupted beam over a horizontal arc of 220 deg., that is to say, from right ahead to 110 deg. on each side.

(*b*) On the right, a green light arranged in such a manner as to throw an uninterrupted beam over the whole of a horizontal arc of 110 deg., that is to say, from right ahead to 20 deg. abaft the beam on the left.

(*c*) On the left, a red light arranged in such a manner as to throw an uninterrupted beam over the whole of the horizontal arc of 110 deg., that is to say, from right ahead to 20 deg. abaft the beam on the left.

(*d*) The three lights—white, green and red—must be visible in each verticle plane corresponding to their respective zones in each direction, comprised between the vertical downwards and the line as nearly as possible approaching to the vertical, and making an angle of at least 30 deg. above the horizontal.

(*e*) The green and red side lights must also be provided with shields or screens, arranged in such a manner that their light cannot be seen on the opposite side.

(*f*) The white light must be visible at a distance of at least 4 kilcms., and the green and red side lights at a distance of at least 2 kiloms. on a dark night with a clear atmosphere.

(*g*) An airship shall, moreover, be provided with the means of showing occasionally a white light astern, if overtaken by another aircraft.

[* A. † The regulations contained in this Article are substantially those which are in force at the present time for the navigation of naval airships, and except that an additional regulation should be made providing for a top light, throwing an uninterrupted beam in a vertical direction upward, the Special Committee approve this Article.]

ARTICLE 3. *Lights to be carried by Flying Machines.*—The rules relative to lights are, in principle, applicable to flying machines, but, as a temporary concession, they need only carry a single lamp or beacon, arranged in such a manner as to show a green light to the right and a red light to the left. The angles of visibility in the horizontal must be those laid down in the case of airships. So far as the angles of visibility in the vertical and the minimum radius of visibility of the lights are concerned, it is simply recommended that the regulations prescribed for dirigible balloons be followed as closely as possible. [* A. † The present regulations in the case of naval and military flying machines provide for port and starboard lights (red and green respectively, but showing in each case a white light straight ahead) and a white tail light. Difficulty is experienced in preventing the lights being masked when viewed from certain angles, and investigation is proceeding for the purpose of overcoming this difficulty. It will be observed that the rules laid down in this Article are not so precise as the existing regulations, and the Special Committee recommend that the international rules shall be so drawn up, in consultation with the flying authorities of the Allied Governments, as to include more definite provisions as to the lighting of flying machines.]

ARTICLE 4. *Lights to be carried by Free Balloons.*—Free balloons must always carry ready for use a white light, which must be displayed on the approach of another aircraft. [* A. † The Special Committee recommend that the white light referred to in this Article should be displayed by free balloons at all times during the period mentioned in Article 1.]

II.—*Audible Signals.*

ARTICLE 5.—(*a*) During fog, mist, snow, or heavy rains, aircraft must, by day as well as by night, make use of powerful, discontinuous, audible signals.

(*b*) In the same circumstances, free balloons must also make use of such signals whenever they are in the neighbourhood of motor-driven aircraft.

(*c*) The above regulations only apply to flying machines so far as is practicable.

[* A. † As regards paragraphs (*a*) and (*b*), the Special Committee are of opinion that paragraph (*a*) should be made applicable to airships and free balloons, and that paragraph (*b*) should consequently be deleted. With regard to paragraph (*c*), the Special Committee understand that the difficulties of providing a satisfactory audible signal as between flying machines are insuperable, and that therefore this paragraph cannot stand in its present form. It is understood, however, that the possibility of providing aeroplanes with magnetic or wireless signalling apparatus is now being investigated, and should any simple system be successfully devised the Special Committee think that an international regulation enforcing its use would be desirable.]

III.—*Rules of the Road.*

ARTICLE 6.—A motor-driven aircraft must always keep at a distance of at least 100 metres from another aircraft in every direction, whether horizontal, vertical, or oblique. [* A. † Articles 6 to 13 inclusive. These Articles, although they contain rather more detailed provisions as to the possibilities of collision, closely resemble the regulations for preventing collisions in the air drawn up in 1912 by the Royal Aero Club, which are in force in the United Kingdom at the present time. The Special Committee are of opinion that the rules of the Royal Aero Club should form the basis of the collision rules in any future Convention, with the addition of the following two suggested rules dealing with the possibility of collision between flying machines and airships: 1. A flying machine must always keep at a distance of at least 200 metres in every direction from an airship. 2. Flying machines must always make way for airships and free balloons, and airships must always make way for free balloons.]

ARTICLE 7.—Motor-driven aircraft must always make way for free balloons. [* A.]

ARTICLE 8.—When two motor-driven aircraft are flying on courses which cross in such a way as to give reason to fear a collision, the aircraft which sees the other on the right of its own course must give way to the other aircraft. When, in accordance with the above rule, one of the aircraft has to change course, the other must keep its own course and maintain its speed. [* A.]

ARTICLE 9.—Every motor-driven aircraft which, in accordance with the above rules, has to give way to another aircraft, must, if circumstances permit, take care not to cross in front of the other aircraft. [* A.]

ARTICLE 10.—When two motor-driven aircraft meet head on or nearly so, following opposite or almost opposite courses, at altitudes which only differ slightly, so that a collision is to be feared, each must turn to the right so as to pass the other on its left. [* A.]

ARTICLE 11.—Notwithstanding any of the rules laid down in the preceding Articles, every motor-driven aircraft overtaking another must steer clear of the latter's course. An aircraft overtaking another is an aircraft which nears another on a course which meets the latter's wake at an angle of more than 20 deg—that is to say, which is in such a position in regard to the aircraft which it overtakes that it could not, at night, perceive either of the latter's sidelights. No later change in the position of the two aircraft can make the aircraft which overtakes the other considered to be *crossing* the latter's route, in the sense of Article 8, nor can such change relieve it from the duty of steering clear of the latter's course until it has absolutely passed it. [* A.]

ARTICLE 12.—Whenever the necessary manœuvres are not specified in the preceding rules, the aircraft which have to manœuvre can do so vertically as well as horizontally. [* A.]

ARTICLE 13.—*In case of imminent collision*, the two aircraft must manœuvre as best they can. In particular, the highest must try to ascend and the other to descend. When they are on the same level and crossing one another, whichever sees the other on the right of its own course must ascend, and the other must descend. [* A. † See Article 6 above.]

ARTICLE 14.—When an airship has stopped voluntarily, it must display a conspicuous black ball; it is then subject to the same rules as an aircraft under way. If it is no longer under control owing to a breakdown of any kind, it must display two conspicuous black balls placed vertically one above the other; it will then be treated as a free balloon. As night in both cases it shall only display a white light, and shall be treated as a free balloon. [* A. † In all the circumstances mentioned in this Article the present practice for an airship is to employ wireles signalling or signalling by flash light. The Special Committee are of opinion that this Article should be re-drafted so as to accord with the present practice.]

IV.—*Landing and Distress Signals.*

ARTICLE 15.—When an airship is about to land it must: *By day*, display a triangular red flag on the underside of the car; *by night*, wave or flash a white light, at the same time keeping the regulation sidelights burning. [*A. † The present system of landing signals in the case of airships is by wireless or flashlight by day or night; in the case of flying machines no particular regulation is in force universally, although Verey light signals are used at night, and can also be employed by day. The Special Committee are of opinion that this Article should be re-drafted so as to apply the present system of landing signals to airships, and that in the case of flying machines the regulations should be the subject of discussion with Allied Governments, always provided that these regulations shall be of the simplest possible character.]

ARTICLE 16.—(*a*) In case of distress, when above land or sea, an airship must, so far as possible:—

By day, display a triangular red flag on the underside of the car, in addition to the two superposed black balls mentioned in Article 14.

By night, wave or flash a white light, and at the same time extinguish the side lights.

By day as well as by night, it can, in addition, make use of an audible signal.

(*b*) A free balloon in distress must:—

By day, display a triangular red flag on the underside of the car; and

By night, wave a white light.

By day as well as by night, it can, in addition, make use of an audible signal.

[* A. † With regard to paragraph (*a*) the Special Committee are of opinion that this paragraph should be re-drafted so as to provide for signals similar to those mentioned in their recommendation in relation to Article 14, but they think that the provision as to audible signals by day and night should be preserved. With regard to paragraph (*b*) the Special Committee approve these regulations. The Special Committee are further of opinion that a short regulation should be added dealing with distress signals by flying machines, which might take the form of smoke bombs or Verey lights.]

Wing-Capt. Groves, R.N., a member of Special Committee No. 2, appended the following reservation to these recommendations:—

"Article 2 (*f*).—This article prescribes for airships distances of at least 4 kilcms. and 2 kiloms. at which the white light and the coloured side lights respectively are to be visible on a dark night with a clear atmosphere. In my opinion, in view of the increased speed of aircraft, the rule should be amended so as to provide minimum distances of visibility of 6 and 3 kilcms.

respectively in the case of small airships, and of 8 and 4 kiloms, respectively in the case of large airships. Such an amendment is desirable when the very short time which a modern aeroplane takes to traverse, *e.g.*, a distance of 2 kiloms., is taken into account."

Lieut.-Col. O'Gorman, a member of Special Committee No. 2, appended the following reservation to these recommendations:—

"*Audible Signals.*—In so far as these signals are intended to warn aeroplanes of the presence of airships or balloons, such signals are of little value, and if the avoidance of collision with aeroplanes is one of the chief reasons for carrying such signals on airships, then it is not worth while to impose the carrying of the appliances for making audible signals on such craft; a wireless or other signal of more universal utility would be far preferable in time of fog."

Special Committee No. 2 appended the following general note to their recommendations:—

"It will be observed that the Draft Convention contains no regulations as to flying into and out of aerodromes. Although the general rules of the air would apply to such flying, it seems to the Special Committee that some aerodrome regulations of a quite general character should be made the subject of international agreement. Such regulations as have been drawn up in the United Kingdom are not completely satisfactory, and the Committee are not in a position to recommend a detailed code. At certain stations the following system is in vogue for controlling inward and outward traffic. Large movable arrows are employed, which can be illuminated at night, and which indicate always the direction of the ground wind; or, in the absence of wind, the best lie of the land. This enables pilots who arrive to land head to wind, while those who start away on a flight also do so head to wind. Some additional and equally simple rule is necessary to prevent the possibility of collision between a machine which is spiralling down to reach the aerodrome and one which is gliding in straight ahead, and also between incoming and outgoing traffic and any machine which might be making practice or pleasure flights above the aerodrome."

Note.—The following four recommendations were inserted at the end of the Draft Convention for the purpose of putting on record the views of particular delegations, although at the time the provisions proposed had not been accepted as practicable by the Conference as a whole:—

Recommendations.

In addition, the Conference makes the following recommendations:—

1. That the Governments shall endeavour to indicate by clearly visible marks certain points which can be used as landmarks by aeronauts, and which should be placed on the ground, or on buildings such as railway stations, &c. [* A.]

2. That the Governments shall mark visibly and uniformly high-tension electric wires, and the supports of aerial cables, and shall indicate their position on aeronautical maps of the same decimal scale in each country.

3. That the regulation of radio-telegraphic communication between aircraft, the earth and ships, as well as all questions of technique and financial adjustment, shall be submitted to the forthcoming London Conference on radio-telegraphy.

[† It is understood that this matter was not considered at the Conference referred to; it is recommended that it may be considered at the next International Conference that may be held on the subject.]

4. That the Governments shall study the question how far it would be useful to set up an International Board for Aerial Navigation, and consider what powers should be conferred on such a board.

APPENDIX B.

DRAFT OF A BILL FOR THE REGULATION OF AERIAL NAVIGATION.

This Bill was in a preliminary stage of preparation and had not been adopted by the Home Office or the Government.

[1 Geo. 5.] A.D. 1911:

Whereas the sovereignty and rightful jurisdiction of His Majesty extends, and has always extended, over the air superincumbent on all parts of His Majesty's dominions and the territorial waters adjacent thereto:

And whereas it is expedient to regulate the navigation of aircraft, whether British or foreign, within the limits of such jurisdiction, and in the case of British aircraft to regulate the navigation thereof both within the limits of such jurisdiction and elsewhere:

Be it therefore enacted by the King's Most Excellent Majesty, by and with the advice and consent of the Lords Spiritual and Temporal, and Commons, in this present Parliament assembled, and by the authority of the same, as follows:—

Power to regulate aerial navigation.

1.—(1) The Secretary of State may by Order regulate or prohibit aerial navigation by British or foreign aircraft or any class or description thereof over the British Islands and the territorial waters adjacent thereto, or any portions thereof, and in particular, but without derogating from the generality of the above provision, may by any such Order:—

(*a*) Prescribe zones (hereinafter referred to as prohibited zones) over which it shall not (except as otherwise provided by the Order) be lawful for aircraft to pass;

(*b*) Prescribe the areas within which aircraft coming from any place outside the British Islands shall land, and the other conditions to be complied with by such aircraft;

(*c*) Prohibit, restrict, or regulate the carriage in aircraft of explosives, munitions of war, carrier pigeons, photographic and radio-telegraphic apparatus and any other article the carriage of which may appear to the Secretary of State to be dangerous to the State or to the person or property of individuals;

(*d*) Prohibit, restrict, or regulate the carriage in aircraft of merchandise or passengers;

(*e*) Make such provision as may appear best calculated to prevent damage and nuisance being caused by aircraft.

(2) If any person does anything in contravention of any of the provisions of any such Order he shall in respect of each offence be guilty of a misdemeanour:

Provided that if it is proved that the contravention was committed with the intention of communicating to any foreign State any information, document, sketch, plan, model, or knowledge acquired, made, or taken, or with the intention of facilitating the communication at a future time of information to a foreign State any information, document, sketch, plan, model, or knowledge acquired, made, or taken, or with the intention of facilitating the communication at a future time of information to a foreign State, he shall be guilty of a felony, and on conviction or indictment be liable to penal servitude for life or for any term not less than three years, and this proviso shall have effect and be construed as if it were part of the Official Secrets Act, 1889.

(3)* Every order under this section shall have effect as if enacted in this Act, but as soon as may be after it is made shall be laid before each House of Parliament, and if an address is presented to His Majesty by either House of Parliament within the next subsequent twenty-one days on which that House has sat next after any such order came into force, praying that the order may be annulled, His Majesty may annul the order, and it shall thenceforth be void without prejudice to the validity of anything previously done thereunder.

Qualifications by owning aircraft.

2.—An aircraft shall not be deemed to be a British aircraft unless owned wholly by persons of the following descriptions (in this Act referred to as persons qualified to be owners of British aircraft),* namely:—

(*a*) Natural-born British subjects;

(*b*) Persons naturalised by or in pursuance of an Act of Parliament of the United Kingdom, or by or in pursuance of an Act or Ordinance of the proper legislative authority in a British possession;

(*c*) Persons made denizens by letters of denisation;

(*d*) Bodies corporate established under and subject to the laws in force in some part of His Majesty's dominions and having their principal place of business in those dominions (all of whose directors and shareholders come under one of the afore-mentioned heads);

Provided that any person who either:—

(1) Being a natural-born British subject has taken the oath of allegiance to a foreign Sovereign or State, or has otherwise become a citizen or subject of a foreign State; or

(2) Has been naturalised or made a denizen as aforesaid;

Shall not be qualified to be an owner of a British aircraft, unless after taking the said oath or becoming a citizen or subject of a foreign State, or on or after being naturalised or made a denizen as aforesaid, he has taken the oath of allegiance to His Majesty the King and is during the time he is owner of the aircraft either resident in His Majesty's dominions or a partner in a firm actually carrying on business in His Majesty's dominions.

Registration of British Aircraft.

3.—(1) Every British aircraft shall be registered in such manner as the Board of Trade may by regulations prescribe:

Provided that an aircraft which is registered under the law of any foreign nation as an aircraft belonging to that nation shall not also be registered as a British aircraft.

(2) Regulations under this section may provide for—

(*a*) the appointment and duties of registrars;

(*b*) the keeping of registers and the particulars to be entered therein;

(*c*) the procedure for obtaining the registration of aircraft by the owners thereof, including the evidence to be produced as to the qualifications of applicants;

(*d*) the issue, form, custody, and delivery up of certificates of registration

(*e*) the transfer and transmission of British aircraft;

(*f*) the fees to be paid;

(*g*) the application with the necessary modifications, for any of the purposes aforesaid of any of the provisions contained in sections twenty to twenty-two, twenty-five, twenty-seven to thirty, thirty-nine to forty-six (except so far as those sections relate to mortgages), forty-eight to fifty-three, fifty-six, fifty-seven, sixty, sixty-one, and sixty-four of the Merchant Shipping Act, 1894

†(3) If an aircraft required under this Act to be registered is not so registered it shall not be recognised as a British aircraft, and shall not be entitled to any of the benefits, privileges, or advantages, or protection enjoyed by British aircraft, not to assume the British national character, but so far as regards the payment of dues, the liability to fines and forfeitures, and the punishment of offences committed on such aircraft, or by any person belonging to it, such aircraft shall be dealt with in the same manner in all respects as if she were a recognised British aircraft.

(4) If any person required under the regulations to deliver up a certificate of registration fails to do so, he shall be guilty of an offence under this Act.

(5) If the owner or pilot of an aircraft uses or attempts to use a certificate of registry not legally granted in respect of the aircraft, he shall in respect of each offence be guilty of a misdemeanour.

Certificate of Airworthiness.

(4).—(1) An aircraft (if not exempted from the provisions of this section by the regulations made thereunder) shall not be navigated unless its airworthiness has been certified in accordance with regulations made by the Board of Trade and the certificate of airworthiness in respect thereof is for the time being in force.

(2) The regulations of the Board of Trade under this section may, amongst other things—

(*a*) prescribe the conditions to be fulfilled (including the equipment to be carried) and the tests to be applied in determining airworthiness;

(*b*) provide for the conduct on behalf of the Board of Trade by other bodies of tests and examinations of aircraft;

(*c*) provide for the issue, form, custody, and delivery up of certificates of airworthiness;

(*d*) provide for the recognition of certificates of airworthiness granted under the laws of any British possession or foreign nation which appear to the Board of Trade effective for ascertaining and determining airworthiness;

(*e*) prescribe the fees to be paid in respect of the grant of such certificates and in respect of applications therefor;

(*f*) provide for the exemption from the provisions of this section of aircraft of any particular class or under any particular circumstances prescribed by the regulations.

(3) The regulations of the Board of Trade under this section may in the prescribed manner require the owner of any aircraft in respect of which a certificate of airworthiness has been issued or is recognised under those regulations to submit his aircraft at any time for such tests and examinations as may be prescribed for determining whether the conditions of airworthiness continue to be fulfilled, and may authorise endorsement on any such certificate of the result of such tests or examinations, and the cancellation of any such certificate, or the withdrawal of the recognition thereof, on its being found that such conditions have ceased to be fulfilled, or on failure to comply with any such requirement as aforesaid.

(4) If any person navigates or allows to be navigated any aircraft (other than an aircraft of an exempted class) in respect of which a certificate of airworthiness granted or recognised under this section is not for the time being in force, or navigates or allows to be navigated an aircraft in respect of which such a certificate is for the time being in force, knowing that the prescribed conditions of airworthiness have ceased to be fulfilled, he shall be guilty of a misdemeanour:

Provided that this sub-section shall not, nor shall any proceedings taken thereunder, affect any liability of any such person to be proceeded against by indictment for any other indictable offence.

Certification of Officers.

5.—(1)‡ Every aircraft when being navigated shall be provided with a navigator duly certificated in accordance with this section, and also, in such

* See 8 Edw. 7, c. 40, s. 10 (3).

* See 57 & 58 Vict. c. 60, s. 1.
†See 57 & 58 Vict. c. 60 ss. 2 (2) and 72.
‡ See 57 & 58 Vict. c. 60, s. 92.

cases as may be prescribed by regulations made by the Board of Trade, with such other officers so certificated as may be prescribed.

(2) The Board of Trade may make regulations—

(*a*) as to the issue and form of certificates of competency under this section;

(*b*) prescribing the cases in which officers other than the navigator are to be certificated, and the number and character of such officers;

(*c*) prescribing the qualifications to be possessed for obtaining a certificate as navigator or as officer serving in any other capacity;

(*d*) for holding examinations of candidates for certificates and for such examinations being conducted on behalf of the Board of Trade by other bodies;

(*e*) as to the issue of new certificates in place of certificates which have been lost or destroyed;

(*f*) as to the cancellation, suspension, endorsement and delivery up of certificates of competency;

(*g*) as to the recognition of certificates of competency issued to navigators and other officers under the laws of any British possession or foreign nation which appear to the Board effective for ascertaining and determining their competency;

(*h*) as to the fees to be paid on the grant of a certificate and by candidates entering for examination.

(3) The regulations shall provide for different certificates of competency being issued in respect of different classes of aircraft, and a navigator or other officer shall not be deemed to be duly certificated in respect of an aircraft of any class unless he is the holder for the time being of a valid certificate of competency under this section in respect of that class of craft, and of a grade appropriate to his station in the aircraft or of a higher grade.

(4) If any person—

(*a*) navigates or allows to be navigated any aircraft not provided with a duly certificated navigator, and, in the case of any aircraft which is under the regulations required to be provided with other certificated officers, without such other officers; or,

(*b*) having been engaged as a navigator or other officer required to be certificated, navigates, or takes part in the navigation of, an aircraft without being duly certificated; or,

(*c*) employs a person as a navigator or as an officer in contravention of this section without ascertaining that the person so serving is duly certificated;

that person shall be guilty of an offence under this Act.

Collision Regulations.

6.—(1)* The Board of Trade may make regulations (hereinafter referred to as collision regulations) for the prevention of collisions in the air, and may thereby regulate the lights to be carried and exhibited, the fog signals to be carried and used, and the steering and flying rules to be observed by aircraft.

(2) All owners and navigators of aircraft shall obey the collision regulations, and shall not carry or exhibit any other lights or use any other fog signals than such as are required by those regulations.

(3) If an infringement of the collision regulations is caused by the wilful default of the owner or navigator of the aircraft, the owner or navigator of the aircraft shall in respect of each offence be guilty of a misdemeanour.

(4) If any damage to property arises from the non-observance by any aircraft of any of the collision regulations, the damage shall be deemed to have been occasioned by the wilful default of the person in charge of the aircraft at the time, unless it is shown to the satisfaction of the court that the circumstances of the case made a departure from the regulations necessary.

Alternative for Subsections (3), (4).

(3) If an infringement of the collision regulations is caused by the wilful default of the owner or navigator of an aircraft or of any person in charge of the craft at the time, that owner, navigator or person shall be guilty of a misdemeanour.

(4) If the infringement of the collision regulations is caused by any wilful default, the wilful default shall be deemed to be the wilful default of the navigator. Provided that if the navigator proves to the satisfaction of the court that he issued proper orders for the observance and used due diligence to enforce the observance of the collision regulations, and that the whole responsibility for the infringement in question rested with some other person, the navigator shall be exempt from any punishment under this provision.

(5) The collision regulations may provide for the inspection of aircraft for the purpose of seeing that the craft is properly provided with lights and the means of making fog signals in conformity with the collision regulations [and the seizure and detention of any craft not so provided.]

Identification Regulations.

†7.—(1) The Board of Trade may make regulations providing generally for facilitating the identification of aircraft, and in particular for determining and regulating generally the size, shape, and character of the identifying marks to be fixed under the regulations, and the mode in which they are to be affixed and rendered easily distinguishable [whether by night or day], and any such regulations may provide for the recognition of identifying marks complying with the law of any British possession or foreign nation which appears to the Board of Trade equally effective for facilitating the identification of aircraft.

(2) The regulations under this section may provide for the seizure and detention of any aircraft which is not marked in accordance with those regulations.

(3) If any person navigates or allows to be navigated any aircraft in respect of which any of the requirements of the regulations made under this section are not complied with, he shall be guilty of an offence under this Act [*qu.* he shall be guilty of a misdemeanour.]

Aircraft Papers.

8.—(1) The Board of Trade may make regulations—

(*a*) requiring logs and such other papers as may be prescribed to be carried in aircraft.

(*b*) prescribing the form of such logs and other papers;

(*c*) prescribing the entries to be made in logs and the time at which and the manner in which such entries are to be made;

(*d*) as to the production, inspection, delivery up, and preservation of logs and other papers.

(2) If any person contravenes any of the provisions of the regulations under this section he shall be guilty of an offence under this Act.

Signals of Distress Regulations.

9.—(1)‡ The Board of Trade may make regulations as to what signals shall be signals of distress in respect of the various classes of aircraft, and the signals fixed by those regulations shall be deemed to be signals of distress.

(2) If a pilot of an aircraft uses or displays or causes or permits any person under his authority to use or display any of those signals of distress except in the case of an aircraft in distress such of those signals as are appropriate to the class to which the aircraft belongs, he shall be liable to pay compensation for any labour undertaken, risk incurred, or loss sustained in consequence of any person having been deceived by the signal [*qu.* he shall be guilty of an offence against this Act].

* See 57 & 58 Vict. c 60, ss. 418 & 419.
† See 3 Edw. 7, c.36, s. 7.
‡ See 57 & 58 Vict. c. 60, s. 434.

Customs Regulations.

10.—The Commissioners of Customs and Excise may, subject to the consent of Treasury, make such regulations as they may consider necessary for the prevention of smuggling and safeguarding the interests of the State with respect to the importation or exportation of goods in aircraft into or from the British Islands, and may for that purpose apply, with the necessary modifications, all or any of the enactments relating to Customs, and may by those regulations, with the consent of the Secretary of State and upon such terms as to payments to police authorities as he may sanction, require officers of police to perform in respect of aircraft all or any of the duties imposed on officers of Customs, and may for that purpose confer on police officers all or any of the powers possessed by officers of Customs.

Post Office Regulations.

11.—The Postmaster-General may make regulations with respect to the conveyance of postal packets in aircraft, and may for that purpose apply, with the necessary modifications, all or any of the enactments relating to mail ships and the conveyance of postal packets in ships.

Trespass and Damages for Injury caused by Aircraft.

12.—(1) The flight of an aircraft over any land in the British Islands shall not in itself be deemed to be trespass, but nothing in this provision shall affect the rights and remedies of any person in respect of any injury to property or person caused by an aircraft, or by any person carried therein, and any injury caused by the assembly of persons upon the landing of an aircraft shall be deemed to be the natural and probable consequence of such landing.

(2) Where injury to property or person has been caused by an aircraft, the aircraft may be seized and detained until the owner thereof has given security to the satisfaction of a justice or an officer of police not below the rank of inspector to pay such damages as may be awarded in respect of the injury and any costs incidental to the proceedings.

Salvage of Wrecked Aircraft.

13.—(1) If any person finds, whether on land or at sea, an aircraft which has been wrecked or lost, he shall as soon as may be communicate with the police or other proper authority, and the police shall communicate the information to the owner of the aircraft if he can be ascertained.

(2) Where any such aircraft is salved, then—

(*a*) if the owner of the aircraft does not abandon his right to the aircraft he shall pay to any persons whose services have contributed to the salvage of the aircraft, including any person or authority who has given or communicated such information as aforesaid, any expenses incurred by them for the purpose and five per cent. of the value of aircraft as salved, after deducting from that amount the amount of the expenses of salvage payable by the owner, to be distributed amongst those persons in such manner as, in default of agreement, the court having cognisance of the case may think just; and

(*b*) if the owner abandons his right to the aircraft, it shall be sold or otherwise dealt with for the benefit of the salvors.

(3) The Board of Trade may make regulations for the purpose of carrying this section into effect, and in particular may prescribe what authority shall be deemed the proper authority, the manner in which communications are to be made, the manner in which an owner may abandon his right to an aircraft, and the manner in which aircraft may be sold or otherwise dealt with for the benefit of the salvors.

Search.

14.—(1)* If any officer of police has reason for suspecting that an offence against this Act of any regulations made thereunder has been or is being committed on board any aircraft, he may enter and search the craft, and may search any person found therein or who may have been landed therefrom:

Provided that before any person is searched, he may require to be taken with all reasonable despatch before a justice, who shall, if he sees no reasonable cause for search, discharge that person, but if otherwise direct that he be searched, and if a female she shall not be searched by any other than a female.

(2) If any person assaults or obstructs any officer of police in searching an aircraft, or in searching any person in the aircraft, or who may have landed therefrom, he shall be guilty of an offence against this Act, and if any officer of police without reasonable ground causes any person to be searched, that officer shall be guilty of an offence against this Act.

Seizure and Detention of Aircraft.

15.—The Secretary of State may make regulations as to the manner in which aircraft, liable to seizure and detention under this Act, may be seized and detained.

Forgery, &c., of Certificates, &c.

16.—†If any person—

(*a*) forges or fraudulently alters, or assists in forging or fraudulently altering, or procures to be forged or fraudulently altered, any certificate of registration, airworthiness, or competency under this Act or any log or other papers required under this Act to be carried in an aircraft: or

(*b*) makes or assists in making or procures to be made any false representation for the purpose of procuring the issue of a certificate of airworthiness, or of procuring either for himself or for any other person a certificate of competency; or

(*c*) fraudulently uses a certificate of registration, airworthiness, or competency which has been forged, altered, cancelled, or suspended, or to which he is not entitled; or

(*d*) fraudulently lends his certificate of competency, or allows it to be used by any other person; or

(*e*) forges or fraudulently alters or uses or assists in forging or fraudulently altering or using, or procures to be forged or fraudulently altered or used, or allows to be used by any other person, any mark for identifying an aircraft,

he shall be guilty of a misdemeanour.

Punishment for Offences.

17.—‡(1) An offence against this Act declared to be a misdemeanour shall be punishable with a fine or with imprisonment not exceeding two years, with or without hard labour, but may, instead of being prosecuted on indictment as a misdemeanour, be prosecuted summarily in manner provided by the Summary Jurisdiction Acts, and if so prosecuted shall be punishable only with imprisonment for a term not exceeding three months, with or without hard labour, or with a fine not exceeding one hundred pounds, or with both such imprisonment and fine.

(2) An offence against this Act not declared to be a misdemeanour shall be prosecuted summarily in manner provided by the Summary Jurisdiction Acts, and shall be punishable with a fine not exceeding one hundred pounds or with imprisonment for a term not exceeding three months, with or without hard labour, or with both such imprisonment and fine.

(3) §Where a person is beneficially interested otherwise than by way of mortgage in any aircraft registered in the name of some other person as owner,

*See 39 & 40 Vict. c. 36, ss. 183-185.
†See 57 & 58 Vict. c. 60, s. 104; 3 Edw. 7, c. 36, s. 5.
‡See 57 & 58 Vict., c. 60, s. 680.
§See 57 & 58 Vict., c. 60, s. 58.

the person so interested shall as well as the registered owner be subject to all the pecuniary penalties by this Act imposed on owners of aircraft, so nevertheless that proceedings may be taken for the enforcement of any such penalties against both or either of the aforesaid parties with or without joining the other of them.

Provisions as to Public Foreign Aircraft.

18.—It shall not be lawful for any aircraft in the service of any foreign State to pass over or land on any part of the British Islands or the territorial waters adjacent thereto except on the invitation of His Majesty [or of some department of His Majesty's Government], and any person carried in an aircraft contravening the provisions of this section shall be guilty of a misdemeanour, and, unless the Secretary of State otherwise orders, the aircraft may be seized, detained, and searched, and the persons carried therein or landed therefrom may be searched in accordance with the provisions of this Act.

Power to Fire on Aircraft Flying over Prohibited Areas.

19.—*If any aircraft flies or attempts to fly over any prohibited zone or being an aircraft in the service of a foreign State flies or attempts to fly over any part of the British Islands or the territorial waters adjacent thereto in contravention of this Act, it shall be lawful for any commissioned officer in His Majesty's navy, army, or marines [not below the rank of], to cause a gun to be fired as a signal, and if, after such gun has been fired, the aircraft fails to respond to the signal by complying with such regulations as may be made by the Secretary of State under this Act for dealing with the case, to fire at such aircraft, and any such commissioned officer and every other person acting in his aid or by his direction shall be and is hereby indemnified or discharged from any indictment, penalty or other proceeding for so doing.

Jurisdiction.

20.—(1) †For the purposes of giving jurisdication under this Act every offence shall be deemed to have been committed in the place in or over which the same was actually committed or in any place in which the offender may be.

(2) Where any person, being a British subject, is charged with having committed any offence on board any British aircraft in the air, over the high seas, or over any foreign country, or on board any foreign aircraft to which he does not belong, or not being a British subject is charged with having committed any offence on board any British aircraft in the air over the high seas, and that person is found within the jurisdiction of any court in His Majesty's dominions which would have had cognisance of the offence if it had been committed on board a British aircraft within the limits of its ordinary jurisdiction, that court shall have jurisdiction to try the offence as if it had been so committed.

(3) Where any offence is committed in any aircraft in the air over the British Islands or in the territorial waters adjacent thereto, the offence shall be deemed to have been committed either in the place in which the same was actually committed or in any place in which the offender may be.

Supplementary Provisions as to British Aircraft.

21.—(1) ‡If any person assumes the British national character on an aircraft owned in whole or in part by any person not qualified to own a British aircraft for the purpose of making the aircraft appear to be a British aircraft, the aircraft shall be liable to be seized and detained under this Act unless the assumption has been made for the purpose of escaping capture by an enemy or by any person in the exercise of some belligerent right.

(2) §If the owner or pilot of a British aircraft does anything or permits anything to be done or carries or permits to be carried any papers or documents, with intent to conceal the British character of the aircraft or of any person entitled under this Act to inquire into the same, or with intent to assume a foreign character, or with intent to deceive any person so entitled as aforesaid, the aircraft shall be liable to be seized and detained under this Act, and the pilot, if he commits or is privy to the commission of the offence, shall in respect of each offence be guilty of a misdemeanour.

(3) ‖If an unqualified person acquires as owner, otherwise than in accordance with this Act or the regulations made thereunder, any interest, either legal or beneficial, in an aircraft assuming the British character, that interest shall be subject to forfeiture.

Application to Foreign Enlistment Act.

22.—The Foreign Enlistment Act, 1870, shall have effect as if the expression "ship" included any description of aircraft, and as if the expression "equipping" in relation to an aircraft included, in addition to the things specifically mentioned in that Act, any other thing which is used in or about an aircraft for the purpose of fitting or adapting her for aerial navigation.

Extent of Act.

23.—(1) The provisions of this Act and of the regulations made thereunder shall, except so far as they are expressly limited to the British Islands and the territorial waters adjacent thereto, apply to—

(*a*) all British aircraft wheresoever they may be; and

(*b*) all foreign aircraft whilst in or over any part of His Majesty's dominions and the territorial waters adjacent thereto;

and in any case arising in a British court concerning matters arising within British jurisdiction foreign aircraft shall, so far as respects such provisions, be treated as if they were British aircraft:

Provided that no such provisions, except those relating to the registration of aircraft and those contained in collison regulations, aircraft papers regulations, and signals of distress regulations, shall apply to aircraft whilst in or over any part of His Majesty's dominions outside the British Islands or in or over the territorial waters adjacent to any such part.

(2) Subject as aforesaid, nothing in this Act shall be construed as limiting the power of the Legislature of any British possession outside the British Islands to make provision in relation to the possession and the territorial waters adjacent thereto with respect to any of the matters dealt with by this Act.

Exemption of Government Aircraft.

24.—This Act shall not, except so far as it may be applied by Order in Council apply to aircraft belonging to His Majesty.

Application to Scotland.

25.—In the application of this Act to Scotland the following modifications shall be made:—

Application to Ireland.

26.—In the application of this Act to Ireland the following modifications shall be made:—

Application of Act to Isle of Man and Channel Islands.

27.—(1) In the application of this Act to the Isle of Man the following modifications shall be made:—

(2) In the application of this Act to the Channel Islands the following modifications shall be made:—

Short Title and Commencement.

28.—This Act may be cited as the Aerial Navigation Act, 1910, and shall come into operation on the day of nineteen hundred and eleven.

*Sec 39 & 40 Vict., c. 36, s. 181.
†See 57 & 58 Vict., c. 60, ss. 684 and 686.
‡See 57 & 58 Vict., c. 60, s. 69.
§See 57 & 58 Vict., c. 60, s. 70.
‖See 57 & 58 Vict., c. 60, s. 71.

APPENDIX C.

RECOMMENDATIONS OF SPECIAL COMMITTEE NO. 1 OF THE CIVIL AERIAL TRANSPORT COMMITTEE AS TO MATTERS OF DETAIL IN THE AERIAL NAVIGATION BILL, 1911, AND SUGGESTIONS AS TO DRAFTING MODIFICATIONS, FOR THE CONSIDERATION OF THE PARLIAMENTARY DRAUGHTSMAN.

As to the terminology of the Bill generally the Committee recommend a revision of terms, *e.g.*, "pilot" for "navigator" and "fly" for "navigating" in accordance with changes in aeronautical terminology which have taken place since 1911. The reference to the Government Departments specified throughout the Bill may need revision.

PREAMBLE.—In line 1 to insert the words "full and absolute" before the word "sovereignty." (See Law Officers' opinion cited in paragraph 2 of Part I. of this Report.) In line 5 to insert the words "control and" before the word "regulate."

CLAUSE 1, 1 (*d*).—In line 5, after the word "merchandise," to insert the word "goods," and after the word "passengers" to add the words "or other persons." In subsection (2), line 20, to substitute "1911" for "1889," as the Official Secrets Act, 1889, has been repealed by the Official Secrets Act, 1911.

CLAUSE 2 (*d*).—In lines 4 and 5 to substitute for the words in square brackets the words "the effective control of which for all purposes is vested in British subjects." (See paragraph 6 of Part II. of this Report.)

CLAUSE 3.—In line 21, after the words "Board of Trade," to insert the words "in the United Kingdom or the competent authority in any British Possession," so as to make it clear that Colonial as well as British registration is contemplated.

CLAUSE 4.—To amend this clause in accordance with the recommendation of the Special Committee referred to in paragraph 6 of Part II. of their Report in such manner as to secure that passenger machines plying for hire shall be of types the airworthiness of which has been duly certified, but that save as above no certification of airworthiness of aircraft shall be required.

CLAUSE 6.—Line 4, after the word "fog" to insert the words "or other." To incorporate the second alternative subsection (3) as preferable to the first, and to combine in this clause the provisions of the two alternative subsections 4. In subsection 5, line 37, after the word "fog," to insert the words "or other." Line 38, to omit the words in square brackets.

CLAUSE 7.—In subsection 1, line 6, to omit the words in square brackets. In subsection 3 to substitute for the words "he shall be guilty of an offence under this Act," the words "he shall be guilty of a misdemeanour." A serious offence may be committed.

CLAUSE 8.—To insert a proviso to the effect that a private aircraft flying in its own country shall be exempted from the necessity of keeping or carrying a log.

CLAUSE 10.—To insert, if thought necessary, some words giving effect to the privileges and exemptions referred to in Article 33 of the Draft Contion, 1910.

CLAUSE 11.—To substitute for this clause, on the suggestion of the Post Office, a clause in the following terms:—(1) All provisions contained in any Act with respect to the conveyance of mails by railways shall apply so far as they are applicable to the conveyance of mail bags and officers of the Post Office by aircraft, and the Postmaster-General may by Post Office Regulations make any necessary modifications in the said provisions with a view to their application to aircraft. (2) In this section the expressions "Mail Bag" "Officer of the Post Office" and "Post Office Regulations" have the same meaning as in the Post Office Act, 1908.

CLAUSE 12.—See the detailed recommendations in paragraph 6 of Part II. of this Report.

CLAUSE 13 (2) (*a*).—In line 8, after the word "aircraft," to insert the words "if salved." As to the fixing of the amount of the salvage award, see note to Clause 13 in paragraph 6 of Part II. of this Report.

CLAUSE 16.—Attention is drawn to the later provisions of the Forgery Act, 1913.

CLAUSE 18.—In line 18, to substitute for the word "invitation" some word which more closely follows the French word "autorisation" in Article 44 of the Draft Convention, and to omit the words in square brackets.

CLAUSE 19.—To substitute for this clause section 2 of the Aerial Navigation Act, 1913, subject to the general recommendations of the Committee contained in their note to Clause 19 in paragraph 6 of Part II. of this Report.

CLAUSE 23.—To re-cast this clause in accordance with the note thereon in paragraph 6 of Part II. of this Report.

CLAUSE 24.—This clause to run as follows:—"This Act shall apply to aircraft belonging to His Majesty except in so far as any part thereof other than Clause 12 may be excluded by Order in Council."

Frightfulness Again.

IF a story published by the Danish *Koebenhavn* is true, it would appear that the Hun idea of frightfulness is still rampant. According to the story of a British officer staying in Copenhagen, on December 5th, at 7 a.m., a young American flying officer, named Coheeny who had been interned for some time as a prisoner of war in a camp near Stralsund, went outside the barbed wire entanglements for a moment. The Soldiers' Council immediately issued an order to shoot Coheeny for this "crime," although the armistice had been signed and Coheeny was no longer a prisoner of war in the real sense of the word. He was taken out and shot, three bullets striking him, and a young British officer was wounded by one of the bullets. Coheeny's comrades sought to carry away his body, but this was forbidden by the Germans.

REVIEWS

"GUYNEMER—KNIGHT OF THE AIR"

IT is a wonderful book Commandant Henry Bordeaux has given us. Not a matter-of-fact record of the day's work and play of a French "ace," but an epic of a modern Roland with the same redoubtable youth and fiery soul as the paladins of old. Guynemer had crusading blood in his veins—France has never lacked a Guynemer when fighting has been toward—and it would almost seem that he was predestined to be one of the new order of knights-errant. Only a few months before the War came he was questioned by his father as to his ideas regarding a career. The reply was simple, but determined:

"Aviator!"

"That is not a career," protested his father, "aviation is still only a sport. No! a thousand times no!"

"That is my sole passion," persisted Guynemer. "One morning at Stanislas (his school) I saw an aeroplane flying. I don't know what happened to me: I felt an emotion so profound that it was almost religious. You must believe me when I ask your permission to be an aviator."

From the story of his brief life, as vividly portrayed for us by his friend, it is plain that flying *was* a passion with Guynemer, and that it found its highest expression in challenging the Boche in the "central blue." An invincible belief in victory and a quiet confidence in himself enabled Guynemer to calmly fight even when the odds appeared to be all against him. As his last *citation*—now inscribed on a marble slab in the Panthéon—says: "He will be considered the most perfect embodiment of the national qualities for his indomitable energy and perseverance and his exalted gallantry. Full of invincible belief in victory, he has bequeathed to the French soldier an imperishable memory which must add to his self-sacrificing spirit and will surely give rise to the noblest emulation."

Not to the French soldier alone, but to all who fight chivalrously on the side of right and justice will this priceless heritage descend.

The book—one of the very few pieces of real literature which aviation can boast—has been admirably translated by Mrs. Louise Morgan Sill, who has contrived to retain that atmosphere of legendary romance with which Commandant Bordeaux has invested his hero. It is true that the technical critic may cavil at certain inaccuracies, but they are not really serious, and the author points out that he is not concerned with the *technique* of flying—he leaves that to abler hands—but with the man.

The book is published by Messrs. Chatto and Windus at 6*s*. net.

"IN THE AIR"

IT is a plain unvarnished tale which Lieut. Bert Hall has given us of his adventures during three years' service on and above three battle fronts. Having knocked about the world, since the age of two, in search of adventure—he had latterly found it in riding high-jumpers and in motor-car racing—he was in France when the war broke out. Within four days he, with about 150 compatriots, formed an American volunteer corps, and obtained permission to train in the grounds of the Palais Royal. On August 24th they were drafted into the Foreign Legion and were ordered to join the *Deuxième Régiment Etranger* from Morocco. Their new comrades were "all nationalities and colours. Most of them were hard customers; they would steal anything from a cancelled postage stamp to a modern dreadnought." Lieut. Hall's *comrade de combat* was an Italian who confided that he had been out of jail only nine days in the previous eight years!

After three months in the trenches Hall, with William Thaw and James Bach, were transferred to the aviation service, went through a period of training and spent over a year in various French squadrons. In the spring of 1916 the suggestion of Norman Prince was adopted and the American pilots in the French Army were formed into what was eventually called the Lafayette *escadrille*. Of their adventures in and around Verdun, which cost them two of their best fighters—Kiffin Rockwell and Norman Prince—Lieut. Hall gives a number of thrilling and graphic stories.

In December, 1916, Lieut. Hall responded to the call for volunteers for service on the Russian front, and he gives an amazing picture of the conditions there. One instance will suffice. "It happened when I brought down my first Boche. I saw him come over at about 1,500 feet altitude and I went after him. I suppose that he thought I was a Russian as he did not pay any attention to me. I proceeded to shoot him down. When I returned I was very much surprised to find that my comrades did not approve of what I had done. They said: 'We have been here a long time and the Germans have never bothered us. Now they will get mad and come and drop bombs on us and may kill some of us.'"

Lieut. Hall later went to the Rumanian front and gives some idea of the terrible conditions there. His adventures included a bombing raid on Sofia.

The book is published by Messrs. Hurst and Blackett at 2*s*. 6*d*. net.

"OVER 'OVER THERE'"

IN his latest volume Major Wilfrid T. Blake, whose *nom de plume* "Wing Adjutant" is so well known to a large circle of readers, has collected some 42 articles and stories which have appeared in various papers. Most of the tales deal with the aeroplane work of the R.A.F. in France, but two relate to "Blimping," one sketches a cruise of a rigid over the North Sea, another shows us a seaplane on anti-submarine patrol and one briefly indicates the exciting times met with by the kite-balloon officer.

As a whole the book is somewhat disappointing, lacking that freshness which characterised its predecessor, "Plane Tales from the Skies." It is stuffed full of thrilling moments and "Wing Adjutant" is as succinct as ever, but there is a sense of monotony about the tales which suggests that the author is playing to the gallery all the time. It would have been better if a few of the pieces had been sacrificed and more liberal treatment accorded the others.

Despite its faults, however, the book will be interesting to many, giving, as it does, numerous examples of "the new type of daring and resourceful heroism" of the "swift-winged knights of the air."

The published is published by Messrs. Cassell at 3*s*. 6*d*. net.

"MORE TOMMY'S TUNES"

THIS is practically an appendix to Mr. Nettleinghame's first volume, "Tommy's Tunes," and it is on much the same lines. There are as a matter of fact fewer tunes but those which are given are better noted than before.

As the compiler points out in the preface these songs are what the soldiers do sing, and not what some people think they sing or would wish them to sing. Some of them may be coarse, some of them may be ribald, but they show the sort of feelings which inspired or depressed the singers and reflect the environment in which they were placed. Some of them may shock those—to quote Mr. Nettleinghame—whose "view on life is obscured by nineteenth-century suburban hypocrisy," but the fact remains that these songs, rhymes and parodies have been sung and fulfilled a purpose. Only those who have endured a long route march know what a difference the chorus "Rolling home," for instance, can make to the "last, long mile." Crude though some of them may be it is well that they should be set down if only that something better may be produced and thus relieve Tommy from the necessity of making up his own tunes.

There are a number of songs relating to the R.A.F., and Mr. Nettleinghame has included the clever parodies of ragtime songs which were written by Mr. Douglas W. Thorburn for "FLIGHT'S" Christmas Greeting last year.

The book is published by Messrs. Erskine Macdonald, Ltd., and, in paper covers, costs 2*s*. 6*d*. net.

"ALUMINIUM"

ALUMINIUM plays such a large part in aircraft and engines for use on aircraft, that it is useful for those who are engaged in designing to have as much information as possible at their disposal. In this connection, a book which will probably prove of use is that written by Mr. J. T. Pattison, F.C.S. Some years ago, when Mr. Pattison was in charge of the chemical laboratory of the Aluminium Corporation, Ltd., he had exceptional opportunities for studying the various processes in connection with aluminium production and manufacture, and he realised the necessity for collating information which up to then was somewhat scattered. His little book is the result. He opens with a short historical survey of various processes which have been or are still being used, and goes on to briefly indicate the occurrence of aluminium in the earth's crust. Succeeding chapters deal with the manufacture of carbon electrodes; pure alumina; the founding of aluminium; alloys of aluminium; and uses and applications of aluminium, and the analysis and examination of aluminium work materials, such as bauxite, red mud, alumina, cryolite, furnace flux, &c. The book is illustrated by several line drawings, and is priced at 7*s*. 6*d*. net. The publishers are Messrs. E. and F. N. Spon, Ltd.

AIRISMS FROM THE FOUR WINDS

POSSIBLY some of those interested in the R.A.F. may like to take a hand in subscribing to the fund which has been opened by the Vicar of All Saints', St. Ives, Huntingdonshire, the Rev. O. W. Wilde, for the restoration of the spire of All Saints', which got into the way of the pilot of one of our aeroplanes last March, with the result seen in our photograph on this page.

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THE damage to the spire of this famous fifteenth century church certainly calls for replacement, and the Vicar announces that the cost of restoration of the church, which has had to be closed, is £7,090, towards which the Government will pay £3,873 15*s.*, leaving £3,216 5*s.* to be found elsewhere. The town has only 3,015 inhabitants, and the district is not a wealthy one. Hence this general appeal by the Vicar and churchwardens for further afield help. All subscriptions will be welcomed by the Vicar, or they can be sent direct to Messrs. Barclays Bank Ltd., marked "St. Ives (Hunts) Church Restoration Fund."

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GLAD to notice that the idea promulgated in "FLIGHT" of the apportionment to Great Britain and the Allies of the German Naval units in compensation for and to the extent of their losses, has been taken up in many directions. Mr. Archibald Hurd also holds this view upon this subject, and in the *Daily Telegraph* the other day, in the course of an informative article, said "the only other course to adopt is to distribute them among the Allied Powers. If that conclusion be accepted, it opens up the question of the principle of distribution. The only justifiable method would surely be to allot the German ships in accordance with the losses which each of the Allied Powers has suffered in maintaining the command of the sea, essential alike for the support of the armies and the civil populations. That under any such arrangement the British Fleet would fare better than any other fleet would not, we may assume, be regarded by the other Allies as vitiating the principle. It has been admitted that the British Fleet saved the Allied cause from ruin, and it is only just that, now that opportunity offers, some proportion at least of its losses should be made good."

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WE asked for views recently in regard to the Fokker "Hanging on to the Prop." article which we published, and by way of an antidote to some of the very technical arguments which have come to hand, is the following lucid explanation of the "stunt"—which, no doubt, our readers will fully appreciate. Our only regret is that it was too late for inclusion in our Christmas supplement. Thus "M.A.F.I.S.," writing from Lilbourne :—

"SIR,

"Subject :—'Fokker hanging on Prop.'

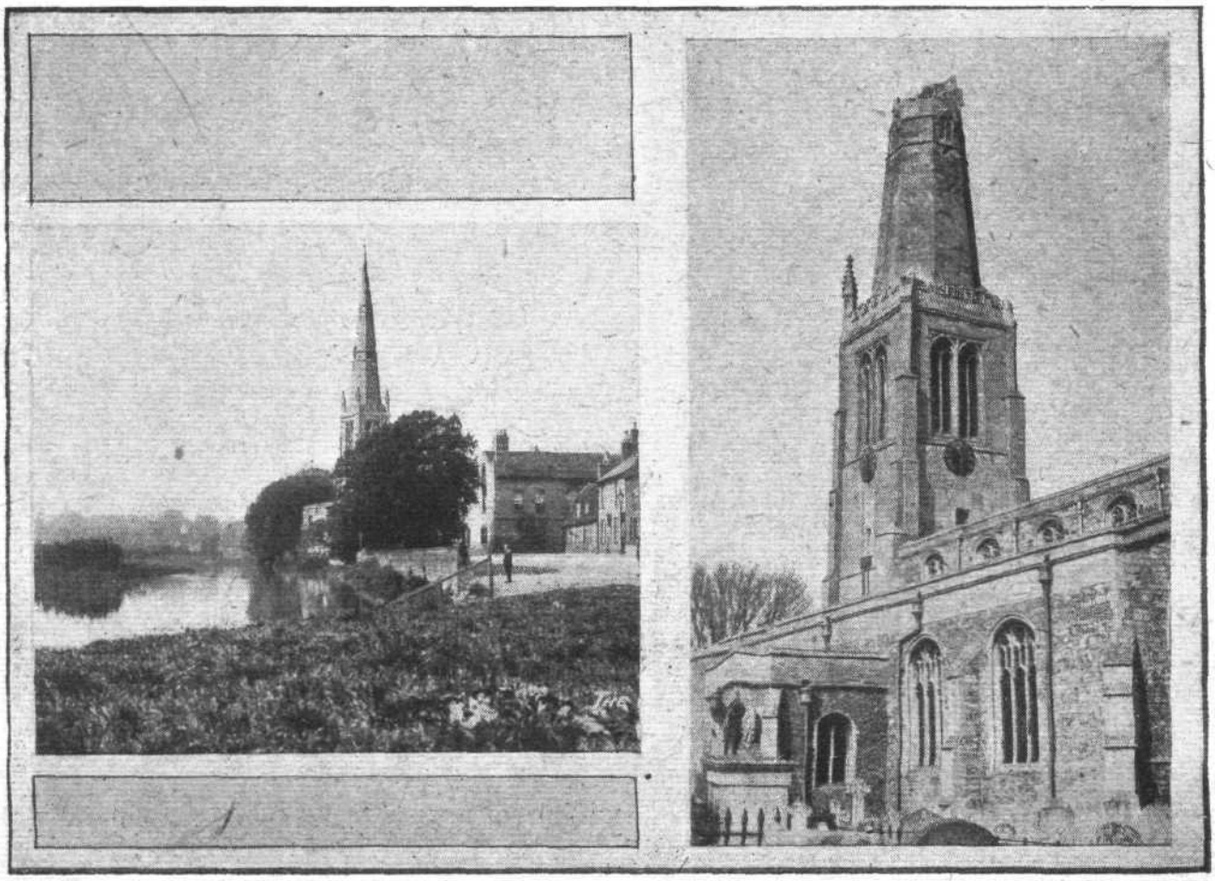
"We have read with great interest, not to say bewilderment, the explanation offered in your columns on the above subject.

"We beg to submit the appended formula, which affords a simpler explanation of this unnatural practice :—

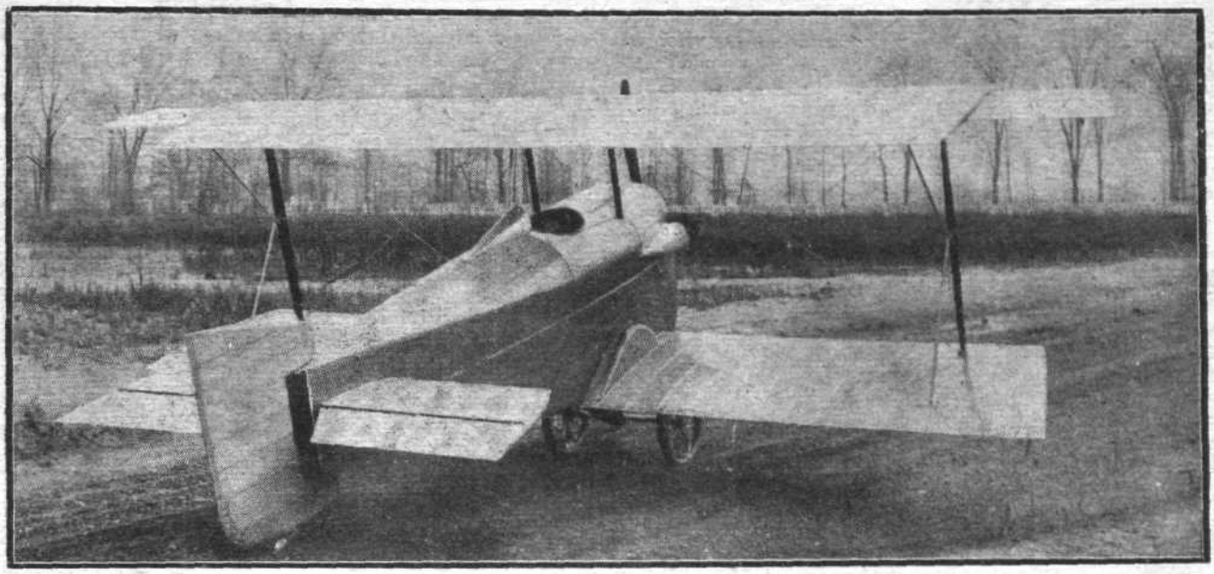
$$K = \frac{n\,\theta^2 \sqrt[q]{\pi \cos\theta\,[p + r\,(P^2 + R^2)]}}{l}$$

where K is constant yet unknown.

"It is obvious from the above formula that the translational slope of the relative flight path could not possibly coincide with the small centre of pressure on the propeller axis.



All Saints' Church, St. Ives (Huntingdonshire) the spire of which was damaged by an aeroplane last March. On the left the church is seen intact, and on the right, after the spire had been through the mill. Curiously the damaged spire is now very similar to the spire of an adjacent church, Hemingford Grey Church.



The latest production of Captain Jas. V. Martin, who will be remembered for his flying at Hendon previous to the War, and who for some years has been at work in the U.S.A. The machine includes several novel features: a folding chassis, K bar cellule truss, wing end *ailerons*, shock-absorber rudder, and a rubber hinge closing the gap between the *fuselage* and the rudder.

"It must, however, be borne in mind that a lot depends on the density of the wind. This will, of course, in accordance with Boyle's Law hold good at all temperatures, the effect of gravity in all cases being ignored except that the prevailing wind at such high altitudes is taken to be vertical. This is due, no doubt, to the disruption of the lines of magnetic force.

"From experience in attempting to emulate this astounding stunt, we have found that should the engine fail suddenly, the machine will not stay in this position for indefinite periods, but will appear to drop in accordance with Newton's Law, even though the principles of Archimedes be applied. This dropping, at first practically imperceptible, becomes more pronounced as the slip-stream is overtaken, till the machine eventually assumes a 'piqué' position.

"We have purposely confined our explanation to generalities so that the lay reader may experience no difficulty in assimilating this simple, yet complicated, aerodynamical phenomenon."

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THE idea is being mooted in France that the great Voisin four-motored machines which were developed for bombing in the Rhineland, will be put into service for commercial ends. One of these monster machines was recently given a trial at Issy-les-Moulineaux, when the pilot made "*un atterrisage impeccable*" a faultless landing. It is hoped that by this means service from Paris to Algiers and Tunis may become practicable in the very near future.

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M. BAZAINE, the administrative head of the Nieuport Company in France, stated in an interview recently granted to a representative of a French contemporary that "terrible competition could be expected very shortly from the English. It so falls out," he said, "that they are in a better position than we to start their industrial machine moving again. Our war machines are not such as would be adaptable for commercial aviation; while our Allies, having concentrated largely on bombing machines, can transform them to-morrow into transport vehicles. But a fortnight ago we could not even think of the change-over to peace conditions. We had neither the time nor the means." M. Bazaine seemed sceptical as to the possibility of effective competition with the steamboat by aeroplane lines from France to England, as under peace conditions the former in conjunction with the railroads

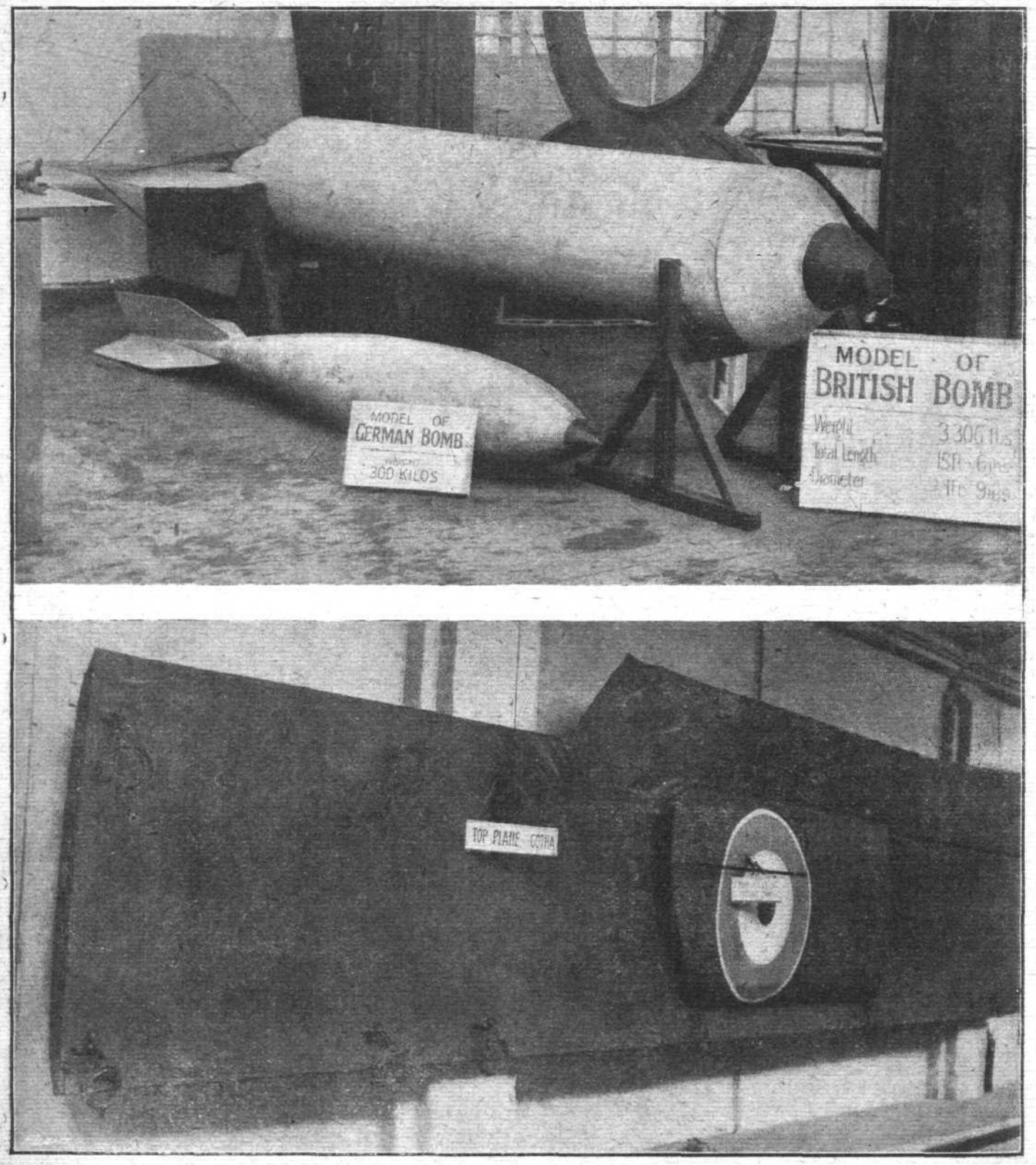
A group of R.A.F. Prisoners of War at Graudenz, W. Prussia, which has been sent us by Mrs. E. M. Cole, the mother of one of the unfortunate officers. From left to right (top row): Lieutenants Love, Harrington, Lomax, Coleman, Anderson, Pruden, Daws, Owen, Westing, Lindsay, Isbell, Lewis, Clemens, Inman, Gerson, Bernhard, Shreeve, Gilbert, and Pope. (Second row): Parsons, Towne, Smith, Peiler, Dean, Hollis, Pickford, Brown, and Dunster. (Bottom row): Smithers, Duce, MacPhie, Millar, Flt.-Sgt. Hodge, Redpath, Rudman, Hopgood, and Cole. (In front): Lieutenant Gillan.

can effect the journey from Paris to London in six hours. A commercial alliance of French manufacturers in view of English competition was also touched upon. The speaker was in favour of this project.

"At the moment," he said, "we un-fog ourselves, like all the world! The transitory period will be difficult, but we shall construct boats, as well as aeroplanes."

AN Exposition of Civil Aeronautics is mooted for Milan at an early date. It has also been proposed that a body of tried aviators should be sent to study aerial transport in other countries, with a view to later establishing an air route between Rome and Naples.

IT seems only yesterday that "acrobatics" became a science, yet a curious indefiniteness prevails as to the real origin of the various feats that are now daily performed by air pilots generally. *Suum cuique honorem reddere oportet* is a counsel to which everyone is particularly anxious to subscribe in war time, but unless sundry mysteries are cleared



AT THE ENEMY AIRCRAFT EXHIBITION, AGRICULTURAL HALL, ISLINGTON.—The exhibition is open to the public from 10 a.m. to 10 p.m. on week days, and from 3 p.m. to 10 p.m. on Sundays. Admission 1s. It is open to the trade and to the Air Services against production of a pass, obtainable on application in writing to C.T.D., Ap. D. (L.), Central House, Kingsway.—The top photograph shows two models of bombs, the larger a British weighing 3,306 lbs., and the smaller a German bomb weighing 300 kilos. The lower photograph shows two wings arranged to give an idea of the relative sizes of two machines. The larger wing is the top plane of a Gotha, while the smaller wing is the top plane of a Sopwith Camel.

up speedily the historian of the air will find himself confronted by the impossibility, for lack of evidence, of determining the names of those to whom the palm should be awarded.

Take, for example, the famous "Immelmann turn." Naturally its invention is popularly ascribed to the greatest pilot the Huns ever produced, but as a matter of fact the phrase was applied in jest by a British airman, the late Capt. C. Gordon Bell, who discovered the feat by accident. Finding a Fokker almost "on his tail" he began a loop, but changed his intention during the ascending half of the circle, as he feared that the Fokker might crash into him before it was completed. Still travelling forwards he rolled the machine over until upside down, allowed it to settle by the head, and then dived, the Fokker having meanwhile, of course, passed overhead. After landing, Capt. Bell described the manœuvre to his fellow-pilots and facetiously dubbed it the "Immelmann turn," the German "star" pilot being at that time at the height of his fame. There are pilots who are unwilling to concede Capt. Bell's priority among Englishmen as the first to execute this "stunt," but he was undoubtedly the originator of the name by which it is known, and the Hun pilot was not the inventor of the feat itself.

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"LOOPING the loop" is almost universally associated with the name of Pégoud, and the majority of those who witnessed his show performances in this country would express surprise at the bare suggestion of any doubt as to the invention of that captivating stunt. None the less the real author of the loop has yet to be established. Firstly, there is the question of whether Blériot inspired Pégoud or *vice versa*. On the one hand it is contended that Pégoud merely flew according to a specific plan worked out in the fertile brain of his employer, and, on the other, it is averred that Pégoud conceived the possibility of looping, but had considerable difficulty in persuading Blériot to build a machine that would stand the strain of being flown upside down.

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IN either case, however, Pégoud, it is claimed, was not the first to loop the loop. On the authority of Mr. A. M. Ramsay, son of Sir William Ramsay, and director of the British Caudron Co., it has been stated that Chanteloup, another French pilot, performed the feat a fortnight before Pégoud, while flying a Caudron machine. Chanteloup was on military service at the time, and was given 15 days' "C.B." for "insubordination" as the result of his spontaneous effort, which was the effect of sheer exuberance.

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BUT even Chanteloup, it is contended, was anticipated by a Russian officer, Lieut. Nestoroff, while yet another Russian, Kostin by name, is credited with a like performance. Thus we see that there are several Richmonds in the field, and the issue may never be decided, as circumstances may have made it impossible by the time the war is ended to obtain conclusive evidence in support of the rival claims.

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ONE thing may be said in passing, however, and that is that looping is now regarded as one of the simplest of accomplishments, and is sometimes effected by pupils on their first "solo" flights. Just before the war, moreover, a young pilot looped before even he had made a cross country flight. Invited, accordingly, to give a display at Shoreham he set off from Eastbourne, but a nasty wind, coupled with his inexperience, caused him to descend near Brighton. A naval pilot at the Shoreham aerodrome volunteered, though on the sick list at the time, to complete the journey. He went out to the spot, flew the machine to Shoreham, and the young pilot, who was brought along by road, then looped the loop before an admiring crowd.

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THE tail slide was a British discovery, but has not been publicly credited to any one performer. There is some reason for believing, however, that its first exemplar was the late Lieut. W. D. R. Moorhouse, an intrepid pioneer who died one of the most gallant deaths of the war. Badly wounded over the German lines, he could have saved himself had he descended at once, but struggled home in order to hand in his report, and succumbed immediately afterwards.

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Two pioneers of aviation, M. Levavasseur and M. Gastambide, the originators of the Antoinette monoplane, which Hubert Latham made famous, have recently turned their attention to variable wing surface construction. We are given to understand that so far the results have been encouraging in the extreme.

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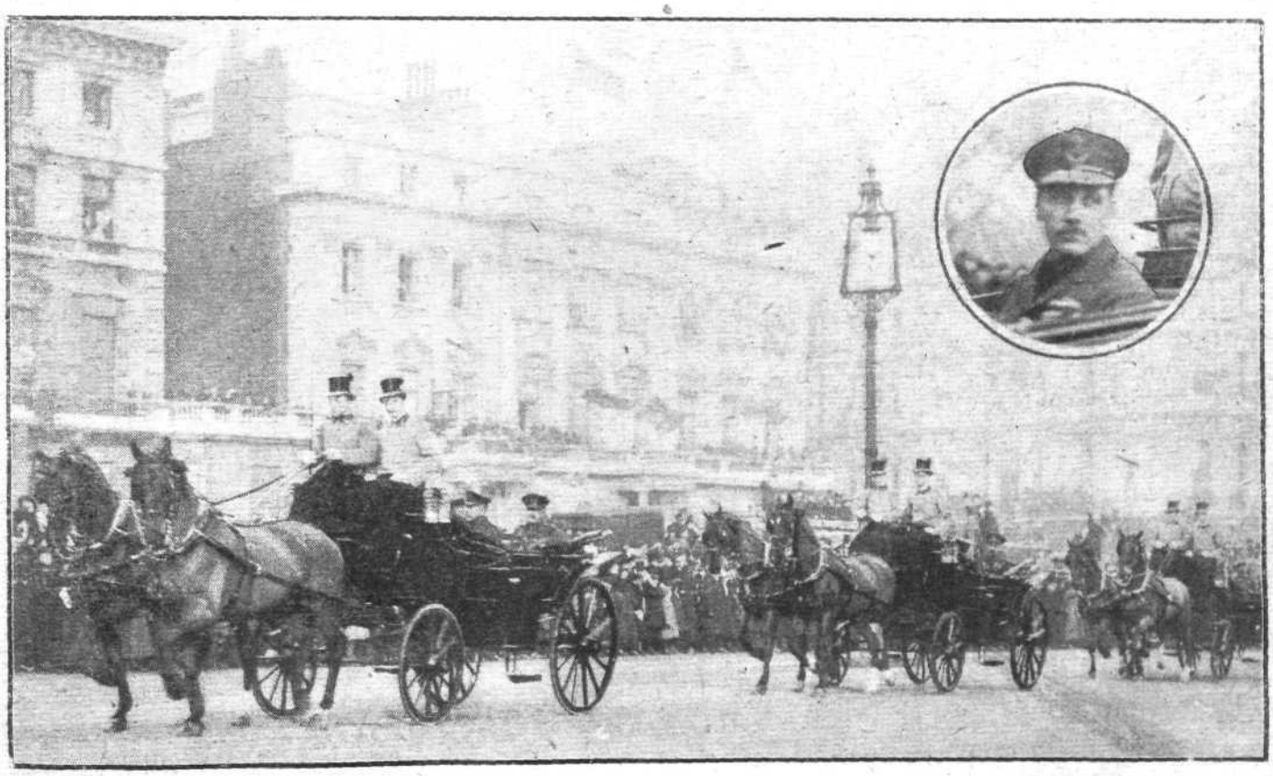

"Flight" Copyright.

HOME-COMING OF FIELD-MARSHAL SIR DOUGLAS HAIG, K.T., AND HIS VICTORIOUS GENERALS.—The procession passing Hyde Park Corner. Sir Douglas Haig is seen in the first carriage. Inset, Major-General J. M. Salmond, C.M.G., D.S.O., commanding the R.A.F. in France, who was in the second carriage.

Personalty.

Casualties

Sec. Lieut. DAVID E. COE, R.A.F., who was killed in action in an aerial battle at Valenciennes, on November 3rd, was the only son of Mr. E. E. Coe, 144, Albany Street, Regent's Park.

Capt. HARRY ESMOND READ, Lincolnshire Yeomanry, attached R.F.C., who died in France on August 10th, at the age of 25, was the only son of Mr. and Mrs. Henry M. Read, late of 4, Lancaster Gate Terrace, W.

Sec. Lieut. ARTHUR LYON TUPMAN, Sherwood Foresters, attached R.A.F., who was killed in action about August 22nd, at the age of 19, was the eldest son of Lieut.-Col. J. A. Tupman, R.M.L.I.

Capt. FERGUSSON BARCLAY, R.A.F., who died on December 7th as the result of an aeroplane accident, was the eldest son of the late Capt, H. F. D. Barclay and of Mrs. Barclay, Manor Mead, Weston-super-Mare.

Capt. W. R. BRUCE-CLARKE, R.A.F., who died on December 1st at the 1st Eastern General Hospital, Cambridge, of pneumonia following influenza, was the only son of the late Wm. Bruce-Clarke, M.B., F.R.C.S., Senior Surgeon of St. Bartholomew's Hospital and 51, Harley Street.

Lieut. R. A. RONALDSON CLARK, M.C., R.F.A., attached R.A.F., who was killed while flying on October 19th, aged 24, was the son of Lieut.-Col. and Mrs. Ronaldson Clark, Cricklewood, Douglas, Isle of Man.

Capt. BRIAN CHARLES O'DRISCOLL DOUGLAS, R.A.F., the only son of Mr. and Mrs. James Douglas, born on September 6th, 1894, was educated at Copthorne School and Winchester (1909-1912). After studying German in Hanover, he entered the Royal Military College, Sandhurst (F. Coy.) on September 3rd, 1913. On September 30th, 1914, he was gazetted to the Connaught Rangers, and after serving in France he transferred to the R.F.C. in December, 1916. He was given his wings, and flew to France in April, 1917. During his third week as corps pilot he brought down two German aeroplanes. On October 5th last Capt, Douglas, at his own request, was transferred to scouts, and at once asked to be sent out with a new squadron going to France on October 30th. He was killed at Hounslow on October 21st, while looping the loop the third time.

Sec. Lieut. GEORGE HAINSWORTH, R.A.F., who died of pneumonia following influenza on December 4th, was the second son of Mr. Joseph Hainsworth, of Dragon Parade, Harrogate.

Lieut. WILFRID HINSLEY, R.A.F., who died of pneumonia following influenza in hospital at Salonika on December 6th, aged 27, was the second son of C. J. Hinsley, Ashenground House, Haywards Heath.

Sec. Lieut. DAVID E. MCCONNEL, R.A.F., who was killed while flying in a fog at Tadcaster on December 7th, aged 18, was the second son of David and May McConnel, of Chantry Green, Steyning.

Capt. HUMPHREY D. STAFFORD O'BRIEN, M.C. (and bar), 1st Northamptonshire Regt., attached R.A.F., accidentally killed on September 14th last in Mesopotamia, was the son of the late Lucius Stafford O'Brien, of St. Johns, Fahan, Co. Donegal, and grandson of the late Henry Stafford O'Brien Stafford, of Blatherwycke Park, Northamptonshire, and grandson of the late Henry Sarell Ongley, of the Diplomatic Service. He passed into Sandhurst and was gazetted to the Leicester Regt., which he joined in India in 1908, remaining there for nearly three years. He then obtained an exchange to the 1st Battn. Northamptonshire Regt. In 1912 he was seconded for service with the Nigeria Regt. (West African Frontier Force), and when the war broke out, being then on leave, he was recalled and served in the operations in the Cameroons till he was severely wounded in the knee and invalided home in April, 1915. For his services he was specially mentioned in despatches by Maj.-Gen. Dobell and awarded the M.C. (one of the first to obtain that decoration) in December, 1914. In January, 1916, he was temporarily attached to the 6th Leinster Regt. at Salonica, and there was awarded a bar to the M.C. for conspicuous gallantry in action. He carried out a valuable reconnaissance under heavy fire, himself killing one of the enemy and capturing a prisoner, setting a splendid example of courage and initiative. In September, 1917, he proceeded to Egypt with the Leinster Regt., and there joined the R.A.F., obtaining his wings last April, and was transferred to Mesopotamia for temporary service in July.

Lieut. ALFRED JAMES PICK, D.L.I., attached R.A.F., as Pilot in Salonika and Egypt, who was killed in a flying accident at Eastchurch, Kent, on December 2nd, aged 23, was the eldest son of Alfred and Ellen Pick, of Bedlington.

Capt. REGINALD RUMSEY, R.A.F. (formerly 10th Welsh Regt.), only son of W. English Rumsey, of Shrewsbury, has died at Gosport at the age of 28, as the result of burns and other injuries received while flying. He was a surviving officer in the heavy fighting at Mametz Wood, after which he was promoted captain and transferred to the R.A.F., in which force he remained until his death. He carried out some brilliant observation work over the German lines. He was a well-known footballer and amateur athlete in the Border counties.

Capt. PATRICK ELIOT WELCHMAN, M.C., D.F.C., K.O. Scottish Borderers and R.A.F., who died on November 29th at 42 Stationary Hospital, Charmes, France, of wounds neglected in German hospital at Metz, was the son of the late Eliot W. Welchman, of Lichfield, Staffs.

Maj. HERBERT FREDERICK WOOD, 9th Lancers, and R.A.F., who died on December 11th, was well-known as the head of the Aviation Department of Vickers, Ltd. He was the only son of Lieut.-Col. D. E. Wood, C.B., of Kilworth, Leicester. He was educated at Harrow and the Military College at Sandhurst, subsequently joining the 9th Lancers, with whom he served in South Africa. On the outbreak of the present war he went to France with his old regiment, and took part in the cavalry operations during the retreat from Mons, including the famous charge at Le Cateau and the advance from the Marne. He was a fine all-round sportsman and a first-class polo player, having played No. 1 in the famous 9th Lancers' team in India. He obtained his aviator's certificate in 1910.

Missing

Sec. Lieut. FREDERICK HUBERT ARCHIBALD WEALE, R.A.F., aged 19, missing October 2nd, 1918, believed killed, was the nephew of Lieut.-Col. H. Cornes, D.S.O., R.F.A., and Mrs. Hugh Crones, Rivermead, Hampton Wick.

To be Married

An engagement is announced between Maj. AUGUSTUS WIELAND BIRD, D.S.O., R.A.F., and CLARICE, the only daughter of Mrs. BARTON-FRENCH, of Paris, and 3, Albermarle Street, London.

The engagement is announced between Lieut.-Col. J. L. FORBES, R.A.F., son of the late Capt. J. A. Forbes, R.N., and Mrs. Forbes, of West Coates, Berwick, and MARJORIE, widow of Capt. Phillip PICOT, and third daughter of Sir Thomas and Lady Putnam, of Greylands, Darlington.

The engagement is announced between Capt. STAFFORD B. HARRIS, A.F.C., R.A.F. (late R.N.), only son of Lieut.-Comdr. G. H. Harris, O.B.E., of Lymington, Hants, and ENID, only daughter of Paymaster-Comdr. W. H. CAMPION, R.N., and Mrs. Campion, and granddaughter of Mrs. Wilsone, of Bonally, Murtle, Aberdeenshire.

The marriage arranged between Lieut. EDWARD R. C. SCHOLEFIELD, R.A.F., son of Mrs. Jay, of 41, Bramham Gardens, S.W., and DOROTHY HELEN, daughter of C. R. SEYMOUR, of Bereweeke House, Winchester, will take place on January 15th.

An engagement is announced between Maj. ROBERT HENRY ROE SCOTT, M.C., R.F.A., second son of Maj. W. T. W. Scott, late Bedfordshire Regt., and MURIEL GEORGINA, widow of Hugh F. MALCOMSON, of Loughlinstown, Priestown, the youngest daughter of the late Gustavus Villiers Briscoe, of Bellinter, Navan.

The engagement is announced between Major E. L. WILLIAMS, M.C., East Yorks Regt. and R.A.F., only sur-

viving son of Major and Mrs. Williams, of Southport, and NORAH CHRISTABEL, "BIDDY" (W.R.A.F.), elder daughter of Dr. and Mrs. L. P. GIBSON, of Cowes, I.W. The wedding will take place at St. Mary's Church, Cowes, on January 15th.

An engagement is announced between Capt. FREDERICK CLIVE AVERY WRIGHT, R.A.F., eldest son of the late John Frederic Wright, and of Mrs. Wright, of Frimley Hall, Camberley, Surrey, and DOROTHY, second daughter of Mr. and Mrs. T. MIELL, of Red Thorn, Hill Lane, Southampton.

Married

Lieut. H. W. DURTNELL, R.A.F., elder son of Mr. and Mrs. Harry Durtnell, of Sevenoaks, was married on December 16th at St. Stephen's, Kensington, to EVALINE ADELA EAST, youngest daughter of the late George East and of Mrs. East, of 1, Southwell Gardens, Kensington.

On the 10th December, at St. Thomas's Church, Fulham, Lieut. ARTHUR JOSPEH FRANKLIN, Royal Dublin Fusiliers and R.A.F., youngest son of Mr. and Mrs. R. T. Franklin, of Ewelme, Wallingford, was married to EILEEN URSULA, daughter of Dr. and Mrs. P. R. DENNEHY, of Lismore, Co. Meath, Ireland.

Col. REDFORD H. MULOCK, D.S.O., R.A.F., son of Mr. and Mrs. W. R. Mulock, of Winnipeg, Canada, was married on December 17th to EDYTHE GOODMAN, daughter of Mr. and Mrs. B. Goodman, of Edgbaston, Birmingham.

Lieut. RAPHAEL CHEVALLIER PRESTON, R.A.F., only son of the late Capt. John Preston, Resident Magistrate of Athlone, Co. Westmeath, Ireland, and Mrs. Preston, of Aspall, Suffolk, and Kew Gardens, was married on November 16th at the Citadel Church, Cairo, to MARGARET, elder daughter of Sidney H. WELLS, of Gezira, Cairo, and Conford, Liphook, Hants, Director-General of Department of Technical Education, Egypt.

Capt. C. PERRONET SELLS, M.C., R.A.M.C.(T.), attached R.A.F., was married on December 18th at St. Anselm's, Davies Street, W., to MARY ANNIE, third daughter of D. S. JONES, Esq., of Penalltgeri, Newcastle Emlyn, South Wales.

Capt. GRAHAM LAUDER WATSON, West Yorks Regt. and R.A.F., son of Mr. and Mrs. J. Falshaw Watson, late of Headingly, Leeds, was married on December 18th, at St. Mary Abbott's, Kensington, to DOROTHY, eldest daughter of the late WILLAIM SORBY and Mrs. SORBY, of Lahore.

Items

Sec. Lieut. DONALD C. TUCKER, R.A.F., who was reported missing March 24th, 1918, was last seen far over the German lines flying in formation. Can any officer who was with him on that day, or in the 41st Squadron, also returned prisoners, give any information as to his fate? Information gratefully received by his parents, Durley Park House, Keynsham, Somerset.

The will of Maj. REGINALD LIDDON ALDERSON, R.A.F., of Gloucester Place, Portman Square, W., who died in hospital, has been proved at £2,730.

The will of Colonel BERTRAM HOPKINSON, C.M.G., F.R.S., R.A.F., of Cambridge, Professor of Mechanics and Applied Mechanics at Cambridge since 1903, killed in a flying accident, has been proved at £16,457.

AEROPLANE PARACHUTES

BY "E. FORGERON"

WHEN the intrepid Pegoud with his triple tandem parachute first proved the feasibility of safely leaving an aeroplane with such a device, his performance met with the same criticism of "useless circus trick" as was forthcoming when the same daring pilot first "looped the loop." Looping is now a recognised aerial manœuvre, and for a considerable time there has been a growing consensus of opinion that a large proportion of aeroplane fatalities might be prevented by the use of suitable parachutes to provide means of escape for the pilot and passengers from machines that it may be essential to abandon owing to fire, failure of controls, structural breakage, etc., and this opinion has been considerably strengthened by the successful escape of German pilots from burning machines by the use of quite a crude apparatus.

Considerable ingenuity has already been expended in the production of various types of parachutes, wherein, by some means or other, the entrance of air in large quantities into the silk body is ensured from the first moment it emerges from the container wherein it is carried. By the adoption of this precaution, descents may be safely made from heights of only 200 or 300 feet, especially as the opening of a parachute launched from an aeroplane is considerably more rapid than when dropped from a balloon, owing to the high initial velocity of the load through the air imparted by the speed of the aeroplane.

But whilst certain and rapid opening is a very important feature of parachutes intended for life-saving purposes from aeroplanes, it is even more essential that the apparatus should clear the machine without any risk of entanglement, for should it fail to do so, the chances of escape for the unfortunate passenger would be even less than had he remained in the cockpit.

The total length of a parachute, including silk body, cords, and the necessary sling, is about 50 feet, so that in a drop from a balloon, the time required for complete extraction from the container is 1¾ seconds. When a drop is made from an aeroplane flying a level course, this time is reduced to rather less than 1½ seconds, owing to the body and connections being blown back into an arc, but this advantage is more than nullified by the increased risk of fouling the tail of the machine, caused by the sudden straightening of this arc when the apex of the silk body is released.

In experiments from aeroplanes with parachutes that require to be extended to their full length before they become fully detached from the machine, numerous instances have occurred of the silk body being more or less seriously ripped by the tail skid, and this in spite of the container being dependent some distance below the *fuselage*, and the favourable condition of a controlled machine flying a practically level course.

Were the machine in a steep dive, the relative acceleration between the parachute passenger and the aeroplane would be much less, and longer time would be required for detachment with a more accentuated sudden straightening of the arc when the apex is released, so that the risk of fouling is greatly increased; in the case of a spinnig machine, complete entanglement with the tail is almost certain.

In order to provide a safety deviec for use from aeroplanes that may be relied upon under all conditions, instead of only the most favourable, a parachute should be *instantly and completely detached* directly its passenger leaves the machine. The writer would suggest that the essential characteristics for such a device might be classified as follows:—

1. Instant complete detachment, so as to prevent entanglement with, or damage from, the tail of the aeroplane.
2. Certainty of opening by provision of means to ensure an adequate initial inflation of the silk body.
3. Method of assembly that will facilitate opening, and avoid any entanglement of the cords.

In addition to the above essentials, other desirable features are that the weight should be as small as possible, the container should be suitable for fitting within the aeroplane, or streamlined beneath, or on top, as may be most suitable for the type of machine to which it is to be fitted, there should be no heavy shock during detachment, assembly into container should be quick and readily performed in the field, without the use of any special apparatus, and the design should be such as to permit of rapid and cheap manufacture.

The Bombardments of Paris

STATISTICS relating to the aerial bombardments of Paris, were released by the Government on December 18th. From these it appears that in 1914 45 bombs were dropped on Paris, 17 being dropped on October 1st; in 1915 70, of which 62 were on March 20th; in 1916, 61; in 1917, 14; in 1918, during the last six months of the war, 396—on January 30th 89 bombs were dropped, causing death to 36 persons and injuries to 192. These bombs were responsible for 1,211 victims, including 402 killed and 809 injured.

The shells thrown on the city by "Big Bertha" numbered 168, which killed 196 people and injured 417; while Zeppelins dropped 228 bombs, killing 206 people and injuring 392. One of these bombs, which failed to explode, is preserved at the municipal laboratory. It measures 9 ft. long and weighs 660 lb. This contained 200 small incendiary grenades, and was apparently the first of the kind used. It is now known that the enemy were manufacturing this type of bomb in large numbers, and it is believed that if the Armistice had not been signed that it was the intention to carry out frequent bombardments of the capital this winter. Each grenade was capable of causing a fire against which water was useless. Sand alone apparently would prove effective to extinguish the flames.

THE ROYAL AIR FORCE

London Gazette, December 17th.

The following temporary appointments are made :—

Colonel (Staff).—Lieut.-Col. F. H. Cleaver, D.S.O., and to be actg. Col. while so employed ; Dec. 7th.

Staff Officer, 1st Class.—(Air.)—Lieut.-Col. R. G. Cherry, M.C., vice Lieut.-Col. (actg. Col.) F. H. Cleaver, D.S.O. ; Dec. 7th.

Flying Branch.

Capts. to be actg. Majs. while employed as Majs. (A.) :—H. L. H. Owen A.F.C., G. M. Turnbull ; Dec. 4th.

Capt. E. C. Emmett, M.C., D.F.C., is granted the actg. rank of Maj. (without pay and allowances of that rank) while specially employed (A.) ; Nov. 30th.

Capts. to be graded for pay as Capts. while employed as Capts. (A.) :—M. J. M. Bryan, P. C. Wood ; Nov. 1st.

Lieuts. to be actg. Capts. while employed as Capts. (A.) :—C. H. R. Lagesse, D.F.C. ; June 19th. F. C. G. Broome, D.F.C. ; Nov. 14th. H. O. McDonald ; Nov. 15th. D. H. Howitt ; Nov. 24th.

Sec. Lieut. (Hon. Capt.) H. W. Stockdale to be actg. Capt. while employed as Capt. (A.) ; Nov. 15th.

Lieut. B. Dangerfield, M.C., to be actg. Capt. while employed as Capt. (O.) ; Nov. 7th.

Sec. Lieut. J. Whitehead to be actg. Capt. while employed as Capt. (O.) ; Nov. 10th.

Lieut. C. H. Collins to be Lieut. (A.), from (T.) ; Sept. 12th.

Lieut. H. A. Edridge-Green to be Lieut. (A'ship), from (Ad.) ; Aug. 21st.

Sec. Lieut. W. F. Dollery, D.F.C., to be actg. Lieut. (K.B.) while employed as Balloon Comdr. ; Nov. 16th.

Lieuts. to be Lieuts. (A.), from (Observer Officers) :—H. W. R. Banting ; Sept. 9th. P. E. G. Heffer, C. J. McGrane ; Nov. 15th. D. P. Hadow, M.C. ; Nov. 16th. N. S. Garrett ; Nov. 17th. G. K. Mappin, P. W. Booth ; Nov. 19th. D. M. Cassidy, M.C. ; Nov. 23rd. A. E. Love ; Nov. 24th.

Sec. Lieuts. (late Gen. List, R.F.C., on prob.) are confirmed in their rank as Sec. Lieuts. (A.) :—W. Meredith ; June 20th. W. P. Bryden ; July 6th. W. P. Conly ; Nov. 15th. D. B. Hughes, R. E. Bolton, A. Arnott, C. W. Miller ; Nov. 18th. O. S. Parker, J. R. Paviman, F. Cardwell ; Nov. 19th. T. V. Symter, S. F. Morice ; Nov. 21st. G. L. Grey, E. P. Gates, W. I. Bannatyne, R. S. Griffiths ; Nov. 22nd. D. Fraser ; Nov. 23rd. W. L. Reeler ; Nov. 25th.

The following are granted temp. commns. as Sec. Lieuts. (A.) :—W. H. Norman (Lieut., R.F.A.), and to be Hon. Lieut. ; Aug. 13th. C. D. Davidson (Sec. Lieut., S. Staffs. R.) ; Sept. 22nd (substituted for notifications in *Gazette*, Oct. 11th and in *Gazette* Dec. 6th). J. B. P. Phillips (Sec. Lieut., R.W. Surr. R.) ; Oct. 4th. W. C. V. Fowler (Sec. Lieut., R. Suss. R., T.F.) ; Oct. 31st. S. Jones (Sec. Lieut., Welsh R., T.F.) ; Nov. 6th. G. B. Mason (T. Sec. Lieut., Glouc. R.) ; Nov. 13th. H. R. Hill, M.C. (Temp. Lieut., S.W. Bord.), and to be Hon. Lieut. ; J. J. St. J. W. Devey (Temp. Lieut., Durh. L.I.), and to be Hon. Lieut. ; P. E. G. Marsh, M.C. (Lieut., A.S.C.), and to be Hon. Lieut. ; W. P. Mills (Temp. Sec. Lieut., Notts. and Derby. R.) ; D. R. L. Railton (Lieut., York. and Lanc. R.) ; E. H. Bennett (Lieut., Gord. Highrs., T.F.), and to be Hon. Lieut. ; A. D. Young, M.C. (Lieut., W. York. R., S.R.), and to be Hon. Lieut. ; S. G. A. Brook (Temp. Lieut., York. and Lanc. R.), and to be Hon. Lieut. ; Nov. 15th.

I. R. Hibbert (Capt., R. Lanc. R.), and to be Hon. Capt. ; Nov. 16th. L. A. Brett (Lieut., Lond. R., T.F.), and to be Hon. Lieut. ; F. Brownles (Temp. Lieut., R.W. Kent R.), and to be Hon. Lieut. ; Nov. 18th. R. Boumphrey (Capt., Lan. Hus., T.F.), and to be Hon. Lieut. ; J. H. MacMillan (Lieut., E. Ont. R., C.E.F.), and to be Hon. Lieut. ; S.R. Holl (Sec. Lieut., Lond. R., T.F.) ; Nov. 19th. H. F. Waldock (Temp. Sec. Lieut., Royal Marines ; Nov. 20th. R. A. Snelgrove (Sec. Lieut., Notts. and Derby. R., T.F.) ; R. A. Rowberry (Temp. Sec. Lieut., R. War. R.) ; C. McH. Sutherland (Sec. Lieut., Gord. Highrs., T.F.) ; Nov. 22nd.

The following is granted a temp. commn. as Sec. Lieut. (A. and S.) :—H. W. Lester (late F. Sub-Lieut., R.N.), and to be Hon. Lieut. ; Oct. 8th (substituted for notification in *Gazette* of Oct. 15th.

The following Sec. Lieuts. (late Gen. List, R.F.C., on prob.) are confirmed in their ranks as Sec. Lieuts. (Obs. Offrs.) :—C. P. Primrose ; Sept. 1st. R. C. Van der Ben, M.C. ; Sept. 8th.

The following are granted temp. commns. as Sec. Lieuts. (Obs. Officers) :—R. Stafford-Langan (Temp. Sec. Lieut., Leins. R.) ; June 6th. J. T. H. Jackson (Temp. Lieut., R.E., attd. A. Sig. Service), and to be Hon. Lieut. Aug. 28th. J. Montg mery (Lieut., R. Sco. Fus., T.F.), and to be Hon. Lieut. ; Sept. 12th. D. Hodson (Lieut., Mahrattas, I.A.), and to be Hon. Lieut. ; Oct. 8th. G. Shallow (Lieut., I.A.R.C.), and to be Hon. Lieut. ; Oct. 9th. R. T. Carter (Temp. Lieut., E. Surr. R.), and to be Hon. Lieut. ; Oct. 14th. A. F. Manton (Temp. Sec. Lieut., R. Lan. R.) ; Nov. 29th.

Lieut. H. Kent (Lieut., L'pool. R.) relinquishes his commn. ; May 8th.

Capt. F. M. L. Barr relinquishes his commn. on account of ill-health contracted on active service, and is granted the hon. rank of Capt. ; Dec. 18th.

Sec. Lieut. (Hon. Capt.) R. H. Wetherall relinquishes his commn. on account of ill-health caused by wounds, and is granted the hon. rank of Capt. ; Dec. 18th.

Lieut. E. B. O. Bouchier relinquishes his commn. on ceasing to be employed ; Dec. 9th.

The following Lieuts. relinquish their commns. on account of ill-health, and are granted the hon. rank of Lieut. :—H. B. Davis, F. G. McIntosh (caused by wounds), H. Senior (contracted on active service) ; Dec. 18th.

Lieut. D. O. Robinson relinquishes his commn., being physically unsuited for the duties of pilot or observer, and is granted the hon. rank of Lieut. ; Dec. 18th.

A squadron of German Albatros scouts with their tent hangars, photographed from another aeroplane at a low altitude.